Machine and Tool BLUE BOOK

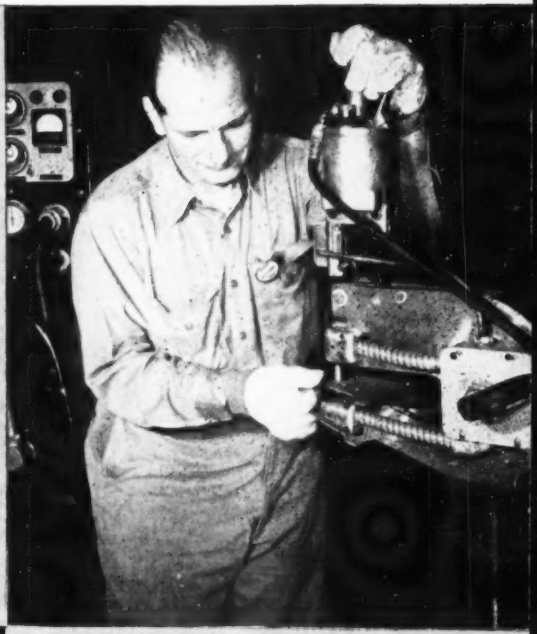
NOVEMBER 1954

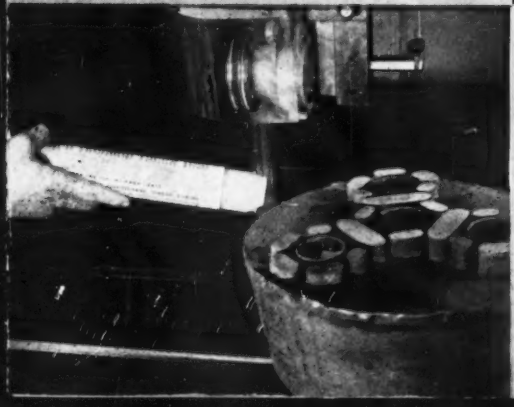
Dimpling Titanium

How Job Shops Can Use Time Study

Cutting Forces in Milling

Lubricating Agents in Band Saws





Letters to the Editor

Interpretation of New Tax Laws

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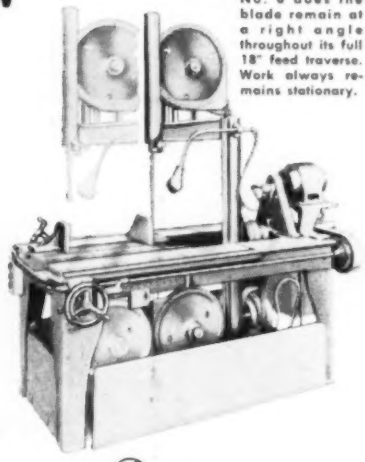
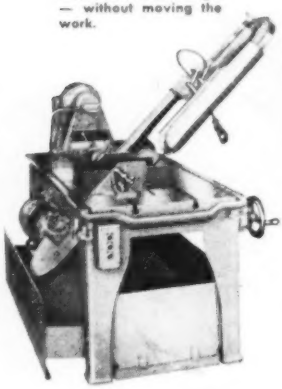
Never Confuse the No. 8 MARVEL with an ordinary Band Saw

...only the MARVEL is Universal

Only on a MARVEL No. 8 does the blade remain at a right angle throughout its full 18" feed traverse. Work always remains stationary.



Only on a No. 8 MARVEL can the saw column be instantly indexed and locked at any angle from 45° right to 45° left, and the saw then fed thru the work at the desired angle — without moving the work.



Only a No. 8 MARVEL can do all of these things: Snip-off a ⅛" rod or cut-off an 18" x 18" cross section.

Rough to Size and Shape

Miter

Index

cut off and shape Structural Beams

Only a No. 8 MARVEL has the large T-slotted work table, with removable quick action vise, that permits accurate set-ups of work of unrestricted sizes and shapes, special fixtures, Etc.

"Rough Machine" to size and shape with minimun chip waste

The No. 8 MARVEL is the "busiest tool in the shop" wherever installed because it is a *universal* tool—has both the capacity and the versatility to handle not only standard sawing jobs but innumerable "trick" and convenience jobs as well. More than a metal saw, the No. 8 MARVEL is a fine machine tool with machine tool features like: Both power and hand feeds; Depth Stops; Automatic Blade Tension; Built-in Coolant Pump; Three operating speeds (or six with 2-speed motor). Moisture-proof electrical controls that conform to both "J.I.C." and "MACHINE TOOL" electrical standards; Dirt-proof ball bearings, etc.

If you cut, machine or fabricate metal, this is a sawing machine you should know about. Write for catalog.

MARVEL *Metal Cutting* SAWS

Better Machines–Better Blades

ARMSTRONG-BLUM MFG. CO. • 5700 West Bloomingdale Avenue • Chicago 39, U.S.A.

How To Make One Machine Equal Two!

KNIGHT'S NO. 50

PRECISION BORING & VERTICAL MILLING MACHINE

SPECIFICATIONS

- Table travel—Longitudinal 28", cross 18"
- Vertical capacity—28"
- Table feeds—Dial type, 16
- Table feeds—per minute, 5/16" to 20"
- Table rapid traverse—both directions, 100"
- Spindle speeds, 16—40 to 2000 R.P.M.
- Boring feeds—Infinitely variable, .0000"–.010"
- Horsepower, 7½
- Weight, 8100 Lbs.

By doing both milling and boring operation that ordinarily require 2 or more single-purpose machines, *work transfers are eliminated,* and *setup time is cut to half or less. Exceptional working capacity* is provided by unusual cross table travel and vertical capacity. Check the specifications at left.

Power to handle any job—rugged strength and rigidity—easy and convenient operation—these are only a few of the many other advantages incorporated in the Knight No. 50. Get *all* the details about this remarkable time-saver and profit-maker.

Mail the coupon today.

ATTACH TO COMPANY LETTERHEAD

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3924 W. PINE BLVD. • ST. LOUIS 8, MO.

Please send catalog on No. 50 and other Knight Milling machines.

Name.....

Title.....

☐ Send information on Knight 20" and 42" Rotary Tables.

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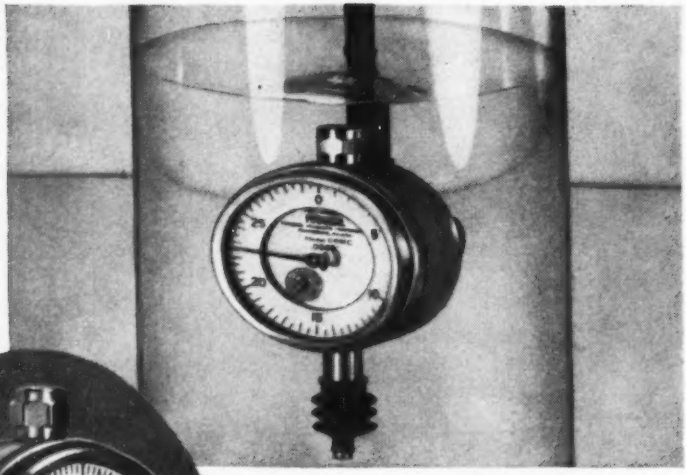

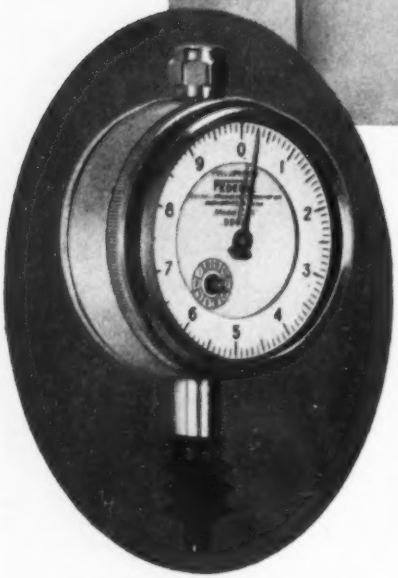

Use this Wetproof Dial Indicator wherever conditions are wet. It will give excellent performance and greatly cut maintenance costs.

AND NOW!

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Completely Sealed—Wholly Protected from Coolant, Oil, Oil Fog, and other Liquid Contaminants

IN ANSWER TO REPEATED REQUESTS from Dial Indicator users, Federal now announces this WETPROOF DIAL INDICATOR which eliminates maintenance troubles commonly encountered under the adverse operating conditions on machine tools. The W Series Dial Indicators are completely wetproofed and built unusually rugged to withstand heavy handling. THE CRYSTAL IS OF GLARE-PROOF GLASS which is remarkably free of halations and will not discolor when exposed to oil or other staining liquids. The dial is double, with a revolution counter optional. After setting the zero (0) by rotating in either direction, the dial can be clamped positively in position by tightening the retaining ring. The indicator spindle and stem bearing permit ranges up to .250". Made to AGD specifications (except for a longer contact point) in our regular "C" size (2¼") Indicator with Cushion Movement and certain modifications to improve performance. TRY THIS NEW INDICATOR ON YOUR WET JOBS. Write

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42511 Eddy St., Providence 1, Rhode Island

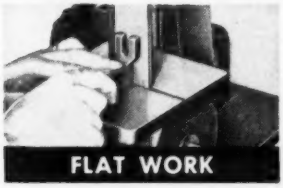
Ask **FEDERAL**

FOR ANYTHING IN MODERN GAGES...

Dial Indicating, Air, Electric, or Electronic—for Inspecting, Measuring, Sorting or Automatically Controlling Dimensions on Machines

Hammond
of KALAMAZOO
FOR
DEBURRING

Model
50-DD



It is amazing how soon these Abrasive Belt Machines pay for themselves.

11 combinations available with or without Duskolector.

"Clip" this ad to your letterhead. 20 page catalog will be sent at once.

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1614 DOUGLAS AVENUE KALAMAZOO, MICHIGAN

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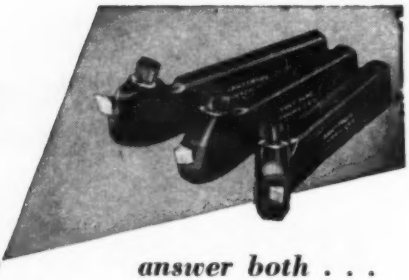

answer both . . .

1. *The problem of lowering costs*
2. *The problem of increasing output*

By providing permanent, multi-purpose, inexpensive ARMSTRONG TOOL HOLDERS that use cutters or bits that are quickly ground from standard high speed shapes (Saving: All Forging, 70% Grinding and 90% High Speed Steel), the ARMSTRONG System of Tool Holders will reduce your tool cost to an absolute minimum.

By providing stronger, more efficient tools, carefully developed for each operation, as well as ARMSTRONG High Speed Steel, ARMALOY Cast Alloy Cutter Bits or Armide Carbide-Tipped Cutters as required for each job. ARMSTRONG TOOL HOLDERS permit greatly increased speeds and feeds, enable you to increase the hourly output of every lathe, planer, slotter, shaper, turret lathe and screw machine.

There is no surer way to lower costs and increase output, than to use the correct ARMSTRONG TOOL HOLDER for each operation on all machines.

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"The Tool Holder People"

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Machine and Tool BLUE BOOK

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Hitchcock Managers are Listed on Page 64

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BPA

HEAVY LOAD/LIGHT WORK

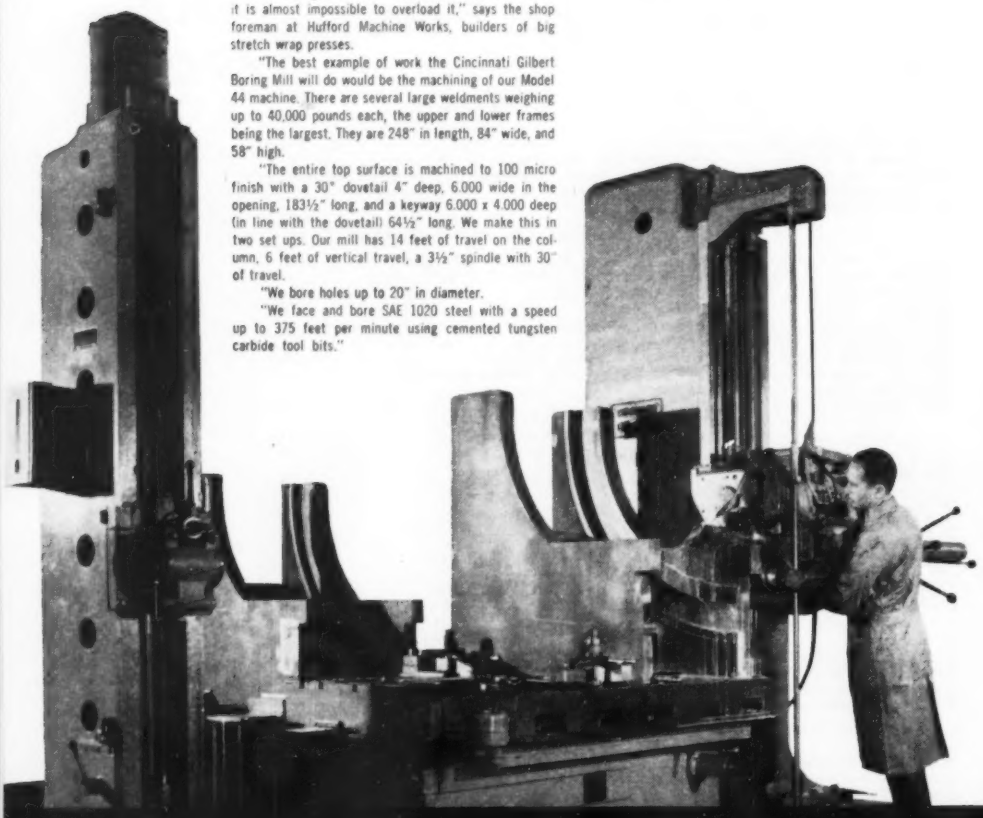
"The thing I like about the Cincinnati Gilbert is that it is almost impossible to overload it," says the shop foreman at Hufford Machine Works, builders of big stretch wrap presses.

"The best example of work the Cincinnati Gilbert Boring Mill will do would be the machining of our Model 44 machine. There are several large weldments weighing up to 40,000 pounds each, the upper and lower frames being the largest. They are 248" in length, 84" wide, and 58" high.

"The entire top surface is machined to 100 micro finish with a 30" dovetail 4" deep, 6.000 wide in the opening, 183½" long, and a keyway 6.000 x 4.000 deep (in line with the dovetail) 64½" long. We make this in two set ups. Our mill has 14 feet of travel on the column, 6 feet of vertical travel, a 3½" spindle with 30" of travel.

"We bore holes up to 20" in diameter.

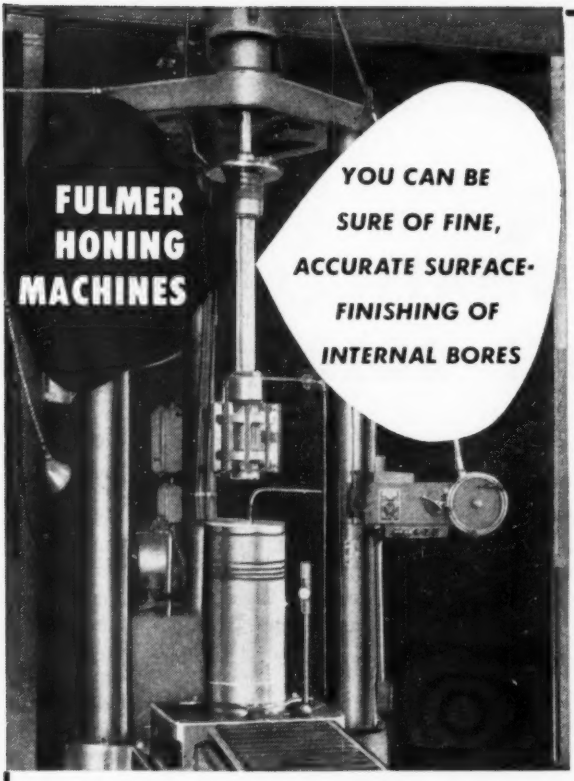
"We face and bore SAE 1020 steel with a speed up to 375 feet per minute using cemented tungsten carbide tool bits."



Centralized controls, frictionless response, maximum flow of power from motor to tool make light work of heavy loads on a Gilbert. Hufford uses a floor type machine with sliding table. Many other arrangements are available. Write for literature on these versatile machines.

GILBERT

THE CINCINNATI GILBERT MACHINE TOOL COMPANY • 3366 BEEKMAN STREET, CINCINNATI 23, OHIO



METAL IS SHEARED OFF

by abrasive stones which produce chips from dust to curly chips up to 6 inches long.

ACCURACY

is guaranteed because all surface irregularities are eliminated to tolerances as close as .0001 (±).

REMOVE AS MUCH AS 1/16 INCH AT 1½ TO 2 CU. INCH PER MINUTE

for ferrous and non-ferrous metals, glass, plastic, etc.

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SURFACE FINISH OF AMAZING SMOOTHNESS results from the self-sharpening abrasive which will not smear or distort the surface and produces a uniform finish on all parts of the bore. Identical finishes may be duplicated by the same honing set-up. Any degree of roughness may be attained from 1 to 100 micro-inches rms.

C. ALLEN FULMER CO.

WRITE for our bulletin on honing.

1242 First National Bank Bldg. **Cincinnati 2, Ohio**

AUTOMATIC GRINDING WHEEL BALANCING *Now on Cincinnati*

This exclusive Cincinnati feature automatically balances the grinding wheel in a few seconds with the spindle rotating at its operating speed.

Eliminates vibration and resultant chatter . . . permits more effective stock removal; produces superior finish; reduces wheel cost per workpiece.

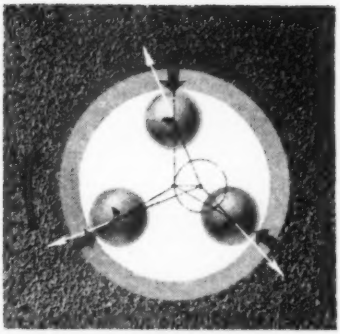
Automatic balancing of grinding wheels climaxes years of Cincinnati research in adapting a fundamental principle of balancing to the needs of precision grinding machines. ¶ Under ordinary shop conditions, using conventional static balancing equipment, even skilled operators will seldom balance the grinding wheels so that a precision balance is obtained. At normal operating speeds the slightest degree of unbalance produces an uneven cutting action. Although not always visible to the eye, this results in a variation of sparking. Cincinnati automatic balancing system is ten times as accurate as conventional static balancing. ¶ Together with trouble-free FILMATIC spindle bearings, automatic balancing of grinding wheels assures smooth, even cutting to closer dimensional accuracy, superior finishes and higher production at a lower cost. ¶ Complete information may be obtained by writing for publication No. G-637-1.

CINCINNATI GRINDERS INCORPORATED
CINCINNATI 9, OHIO

CINCINNATI

CINCINNATI

CENTERTYPE GRINDING MACHINES
CENTERLESS LAPPING MACHINES •



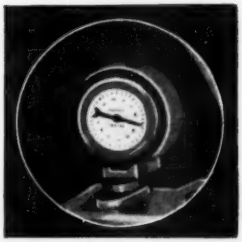
Here's how it works. Three steel balls are carried in a raceway in the wheel end of the spindle. As the spindle rotates, the balls are free to move and correct any unbalanced condition that may exist. Then they are clamped in position.

FILMATIC

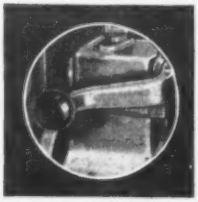
Standard Equipment

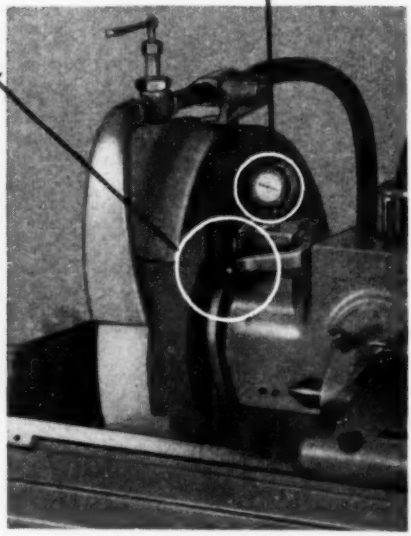
Filmatic 6", 10" L, 10" and 14" L PLAIN HYDRAULIC GRINDERS

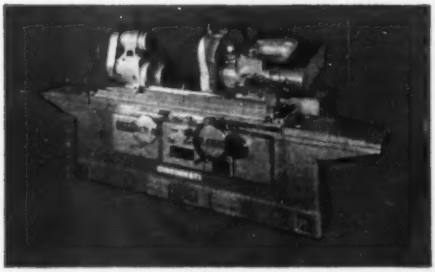
An indicator needle tells the operator when the system is balanced.



This lever clamps and unclamps the balls in their raceway. Anyone can perfectly balance the grinding wheel... in a few seconds' time.



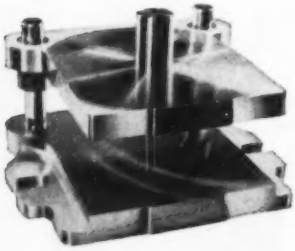




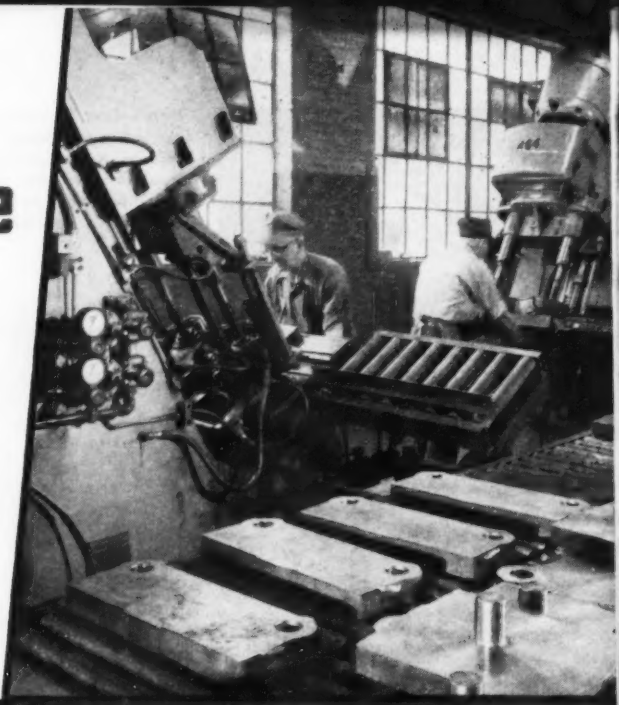
CINCINNATI FILMATIC 10" x 36" Plain Hydraulic Grinding Machine.

- CENTERLESS GRINDING MACHINES
- MICRO-CENTRIC GRINDING MACHINES

Fastest die set service ever



. . . made possible by Danly's unique mass-production and distribution system.



At the main Danly plant . . . high speed precision drilling, four-change-table fixtures accommodate the full range of standard die set sizes.

At your Danly Branch plant . . . shipping die sets to your order. Up-to-date procedures and facilities assure fastest delivery.

To make your tooling program move faster, Danly mass produces interchangeable, precision die set parts . . . stocks them at your local Danly Branch ready for quick assembly to your order and delivery to you. With Danly, from the time you place your order until the set is delivered to you is a matter of only a few days. This extra fast delivery starts at the main Danly plant in Chicago where two complete high-speed production lines turn out a wide variety of precision die set parts. Held in ample stock by your local Danly Branch, these interchangeable parts are assembled to your order and delivered immediately. Don't let lagging die set delivery bog down *your* tooling program. Order from your Danly Branch and get the fastest service . . . ever.

Fast, nationwide delivery from these branch plants

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[illegible]	1700 East 39th Street
[illegible]	1 Dunham Avenue
[illegible]	1248 Trenton Avenue
[illegible]	1-3 Michigan Street N.W.
[illegible]	5 West 10th Street
[illegible]	47-03 37th Street
[illegible]	Dustrumen Metals & Supply Co., 4000 South Alameda
[illegible]	111 East Wisconsin Avenue
[illegible]	511 W. Courtland Street
[illegible]	30 Foster Street

DANLY

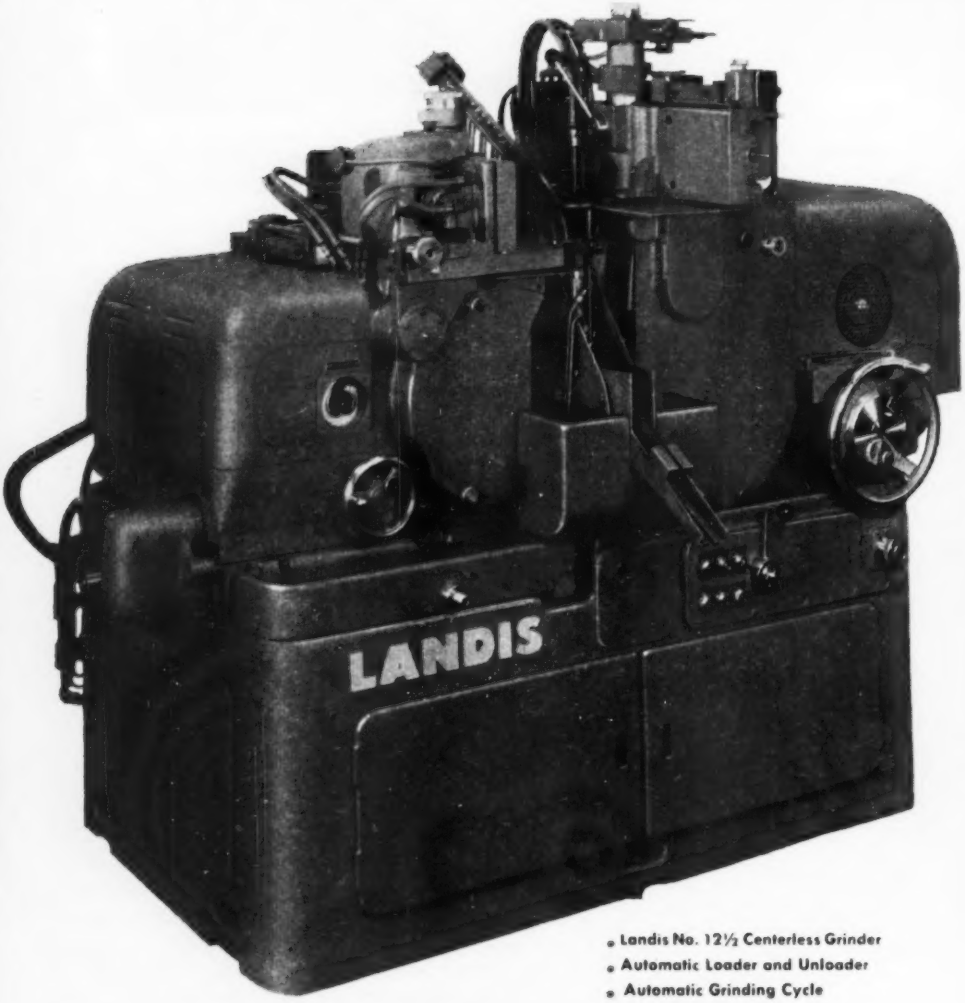
DANLY MACHINE SPECIALTIES, INC.

2100 South Laramie Avenue
Chicago 50, Illinois

Here is one of the year's largest planers. Like all Gray planers from king-size Giants to eager Cubs, it's built for high production, with more original engineering developments and production features than any other planer. They are in such demand that GRAY is the largest planer builder, further proof that *Quality doesn't cost . . . it pays.*

The G. A. GRAY Co., Cincinnati, Ohio

Completely Automatic Operation



- Landis No. 12½ Centerless Grinder
- Automatic Loader and Unloader
- Automatic Grinding Cycle
- Automatic Wheel Dressing

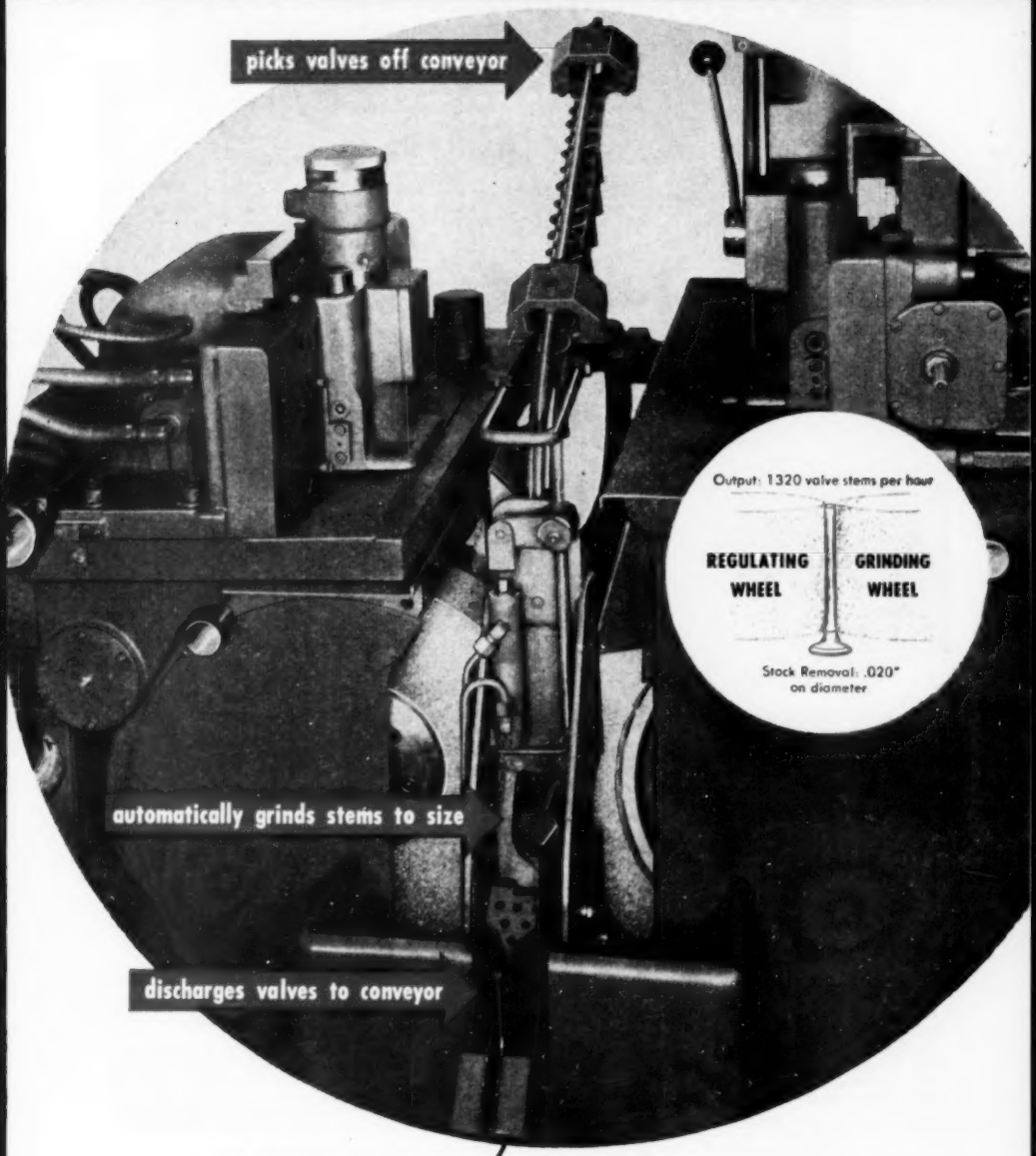
This new Landis No. 12½ Centerless grinder now makes possible reduced grinding costs for work up to 6" diameter. Automatic operation, like this example, can reduce your grinding costs. Send your data for production estimates.

LANDIS

precision grinders

1905 Ad. No. 180
Beaumont, Heller & Sperling, Inc.

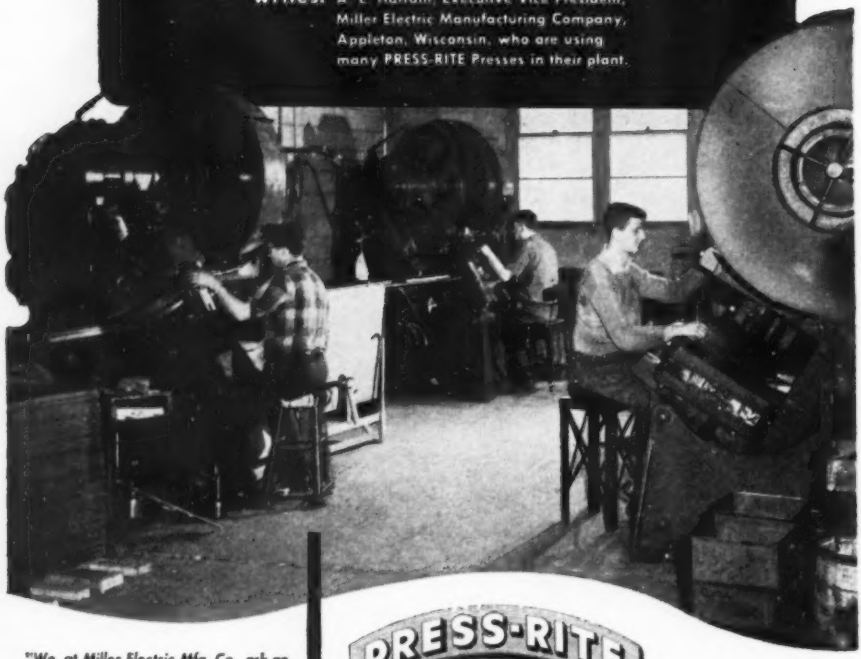
cuts centerless grinding costs


picks valves off conveyor
Output: 1320 valve stems per hour
REGULATING WHEEL
GRINDING WHEEL
Stock Removal: .020" on diameter
automatically grinds stems to size
discharges valves to conveyor

LANDIS TOOL COMPANY / WAYNESBORO, PENNA., U. S. A.

"We use our presses hard..."

writes: A. E. Harrant, Executive Vice President, Miller Electric Manufacturing Company, Appleton, Wisconsin, who are using many PRESS-RITE Presses in their plant.



"We, at Miller Electric Mfg. Co., ask an awful lot of our Press-Rite Presses, but we always seem to get a lot out of them.

As a leading manufacturer of arc welders and accessories, we produce laminations and various stampings, that come out accurate and true. Our insistence of high quality workmanship, plus the use of high quality material, makes it mandatory that we use quality equipment to produce quality products."

A. E. Harrant

PRESS-RITE
OPEN BACK—INCLINABLE
POWER PRESSES

. . . ruggedly built for production and service

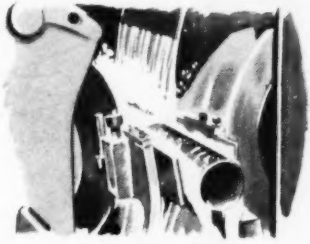
Ruggedness for the toughest job . . . durability for long continuous service . . . precision built for accuracy and high production . . . all these are built into every one of the 8 PRESS-RITE Presses from 5 to 85 ton capacity. And, there are many other advantages which thousands of users acclaim as they tell of the satisfaction they receive from PRESS-RITE Presses.

The complete story of PRESS-RITE Presses is told in an illustrated 8 page brochure. Write for your copy today. See how PRESS-RITES can help you as they are helping others.

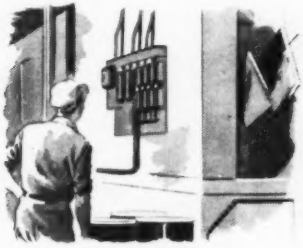
Sales Service Machine Tool Co. SSMT
PRESS RITE PRESSES - SHAPE RITE SHAPERS - KELLER POWER HACK SAWS
2355 UNIVERSITY AVENUE - ST. PAUL 4, MINNESOTA

New S.E.C.O. is Tops For These Operations

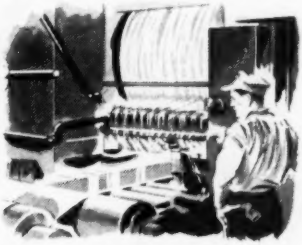
CUTTING WITH NEW S.E.C.O. Tools stay cool—require less frequent grinding. Finishes are uniformly good.



GRINDING WITH NEW S.E.C.O. Surface finishes are good. Loading and glazing of wheel are reduced—wheel life is prolonged.



WASHING WITH NEW S.E.C.O. Thorough removal of grease and dirt provides clean surfaces for smooth, long-lasting finishes.



ROLLING WITH NEW S.E.C.O. Rolls stay clean. You get maximum reductions and low power consumption.

New Sunoco Emulsifying Cutting Oil increases production, cuts operating costs. Its high machining efficiency permits uniformly good finishes, prolongs tool life. Its high detergency and purity keep tools, parts and machines clean. Its excellent mixing qualities permit its use in cold, hard or hot water. Test New S.E.C.O. in your own plant. For more information, call your nearest Sun office or write SUN OIL COMPANY, Philadelphia 3, Pa., **Dept. MT-11.**

INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY

SUNOCO

PHILADELPHIA 3, PA. • SUN OIL COMPANY LTD., TORONTO & MONTREAL

Refiners of famous High-Test Blue Sunoco Gasoline

"KNOW HOW"

KNOW HOW

The ability of a bird dog to flush a pheasant, to retrieve and to follow the basic rules of the "point" . . . is the result of natural aptitude, training and experience — qualities that combine to form the priceless ingredient called "know how".

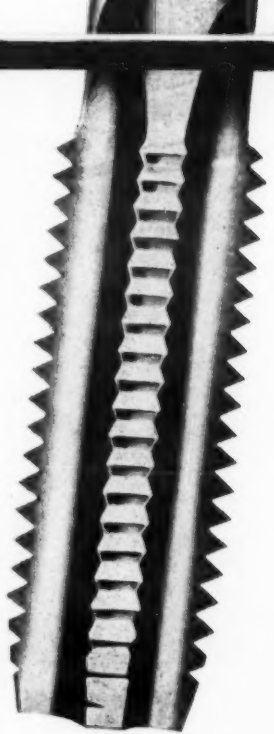
At the Bath plant, these same qualities — natural aptitude, training and experience — provide the basic "know how" of Bath craftsmen who are responsible for the design and manufacture of Bath taps and gages.

Tap design problems are first worked out on the drawing board, to take final shape in taps that meet the demand for working all metals and to overcome unusual conditions. This takes knowledge of a specialized nature.

Bath engineers check every detail, to see that all Bath Taps are conditioned to do the best threading job for your requirements.

Research and laboratory experiment is a constant aid to improvement in the manufacture of taps, to maintain the high standard of Bath tap performance and dependability. Here, the natural aptitude, training and experience of Bath personnel, pays off.

When a stubborn threading problem confronts you — rely on Bath "know how" for helpful assistance and advice.



Insist on BATH TAPS for BETTER THREADS

JOHN BATH & CO., Inc.

14 Grafton St., Worcester, Mass.

PLUG CYLINDRICAL AND THREAD GAGES • RING THREAD GAGES • GROUND THREAD TAPS • INTERNAL MICROMETERS

Your NEW KEY to Precision TAPPING

MORSE "Vectormatic Ground" TAPS

Now Morse takes another giant step ahead . . . this time with "Vectormatic" Tap-Thread Grinding . . . an entirely new process that includes an entirely new method of close-tolerance gaging.

The tap is sized by exclusive Vectormatic "Magic-Mike" control. Size control mechanism and the adjusting segment of the circuit are *completely locked-in*, to insure uniformity.

In the whole operation, the work is never touched by the gaging mechanism, which is controlled by an invisible wall of electrons activating a series of relays. Control mechanism is unaffected by voltage fluctuations and vibrations.

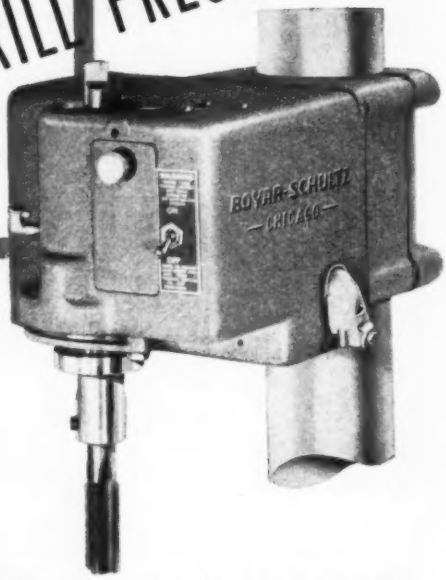
That's why Morse Vectormatic Thread Grinding is the most precise method in use today . . . and why Morse Taps are now, even more than ever before, your best buy. Call your Morse-Franchised Distributor *now* . . . your only source for Vectormatic Ground Taps.

MORSE TWIST DRILL & MACHINE COMPANY
(*Division of VAN NORMAN COMPANY*)
NEW BEDFORD, MASS. • *Warehouses in New York, Detroit, Chicago, Houston, San Francisco*

MORSE
Cutting Tools

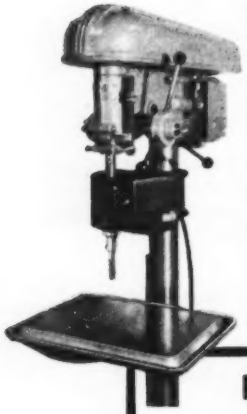
. . . buy them by phone from your Morse-Franchised Distributor and save ordering time

YOU GET MORE FROM YOUR DRILL PRESS *with*



Boyar-Schultz LEAD SCREW TAPPING ATTACHMENT

Change Your Ordinary Drill Press to a Precision Tapping Instrument in Minutes — Quickly and easily fitted to your drill press, it makes an efficient Tapping Attachment that can produce any thread including Class 4.



No special skill required for operation. Anyone familiar with a drill press can consistently produce accurate threads.

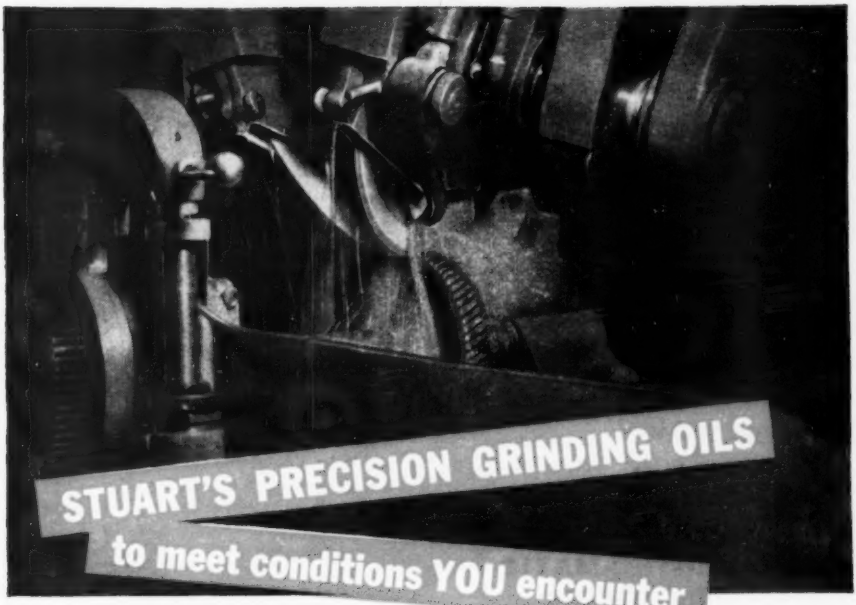
Foot control switch leaves hands free for loading work. Built in reversing switch actuates drill press motor, eliminating need for any intermediate reversing device.

Long, trouble-free life of bronze nut and ground thread Lead Screw is assured, because of their generous 1¾" diameters.

Extreme accuracy in control of tapped hole depth is assured by electrically controlled reversing switches.

All taps up to ⅞" diameter usable with standard adapter bushings. Adapters for taps 15/16" to 2" available on special order.

BOYAR-SCHULTZ CORPORATION
2008 South 25th Avenue, Dept. A-T, Broadview, Ill.



IF your grinding operation requires a straight oil there is a Stuart grinding oil that will meet the various conditions and problems *you* encounter. When using the *right* Stuart grinding oil for the job you can expect better wheel form and longer wheel life, better surface finish and closer tolerance control.

There are three types of grinding oils...hard, medium and soft. "The Man in the Barrel," your Stuart Representative, will be happy to help select the proper grinding oil for your particular needs. Fill out the coupon below today.

HARD ACTING GRINDING OILS

. . . for grinding soft, tough, stringy materials such as stainless steels, monel metal and high temperature alloys.

MEDIUM ACTING GRINDING OILS

. . . for use on the wide range of average work. They are fluids that have had both hard and soft acting qualities scientifically balanced.

SOFT ACTING GRINDING OILS

. . . possessing high lubricity characteristics they are usually recommended when the work material is of high hardness.

More than a "Coolant" is Needed

D.A. Stuart Oil Co.
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TIME-TESTED CUTTING FLUIDS AND LUBRICANTS

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***In Canada:* Canadian D. A. Stuart Oil Co., Ltd.**
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Please send a Stuart's Precision Grinding Oils Bulletin to:

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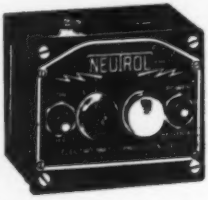
☐ **Please have "the Man in the Barrel" call**

ELECTRICAL CONTROLS FOR INDUSTRY

NEUTROL

ELECTRO-MAGNETIC CHUCK CONTROL



50 to 15,000 Watts . . . 60 to 20,000 Sq. In. Chuck Area.

Releases and demagnetizes work pieces simultaneously. No time lost. No damage to work or chuck face. Protects chuck from voltage surges. Speeds production.

ELECTRO-MATIC RECTIFIER

50 Watts to 40 Kilowatts

Engineered for dependable power conversion in constant year after year service. Quiet and efficient. For all industrial applications.

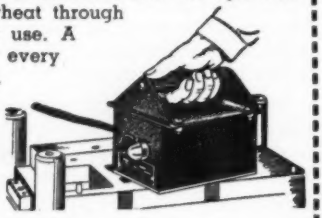
NEUTROLATOR

NEUTROL CHUCK CONTROL and HOLDING POWER REGULATOR

Combines the advantages of NEUTROL with the benefits of absolute voltage regulation. Control of holding power is infinitely variable through entire dial range. Best holding power predetermined for an operation is automatically repeated. Assures true parallel grinding. Manual or automatic control models.

ELECTRO-MATIC A.C. DEMAGNETIZER

Demagnetizes dies, punches, cutters, tools that have been magnetized from any source. Works by simple contact. Operates on standard A.C. voltage. Will not overheat through constant use. A size for every purpose.



All Models Fully Warranted

Special Models Engineered to Meet Every Need

Your Inquiries Will Be Promptly Answered Without Obligation.

ELECTRO-MATIC PRODUCTS CO.

2235-37 N. KNOX AVE., CHICAGO 39, ILLINOIS, U. S. A.

Each year more and more firms are discovering COMTORPLUG

"PACKAGED PRECISION"

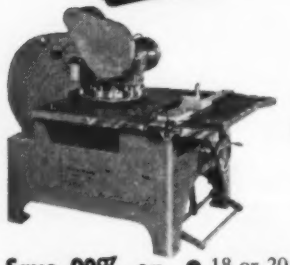
NEEDS NO WIRES, HOSE, ELECTRONIC GEAR OR HEAVY BASE

REQUEST NEW BULLETIN NO. 48

COMTOR CO. 62 FARWELL ST., WALTHAM 54, MASS.

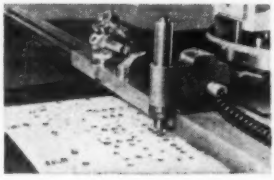
SAVE 90% with a WIEDEMANN

The RA-41P Turret Punch Press *Pays for itself in 2 YEARS or LESS*



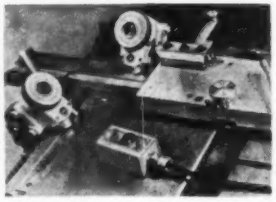
Save 90% on PIERCING

- Unmatched for high speed, low cost duplication of intricate hole patterns in flat sheet metal —low to medium production quantities.
- 18 or 20 punches and dies in turrets ready for use.
- Hole locations are made to a color-coded template—50 or more holes per minute.



Save 90% on TEMPLATE MAKING

- Press can be supplied with optical dimensioning instruments for template making.
- These templates are used with the RA-41P as well as for other applications. Drill jigs, prototypes, etc. are also produced to a tolerance of ±.002" in 10% of the time usually required.



Wiedemann ships each press tooled—ready to produce your parts as soon as the machine is leveled and connected to your power line.

Wiedemann engineers will be pleased to study your drawings and show how these savings can be yours.

WRITE FOR A COPY OF BULLETIN 241

WIEDEMANN MACHINE COMPANY

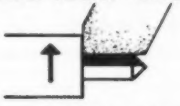
4265 Wissahickon Avenue, Philadelphia 32, Pa.

RO LEAVES METAL BEHIND THE EDGE—MAKES TOOLS LAST LONGER!

THE NEW ROYAL OAK UNIVERSAL FORM RELIEVING FIXTURE

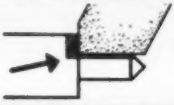
GRIND

RADIAL RELIEF ONLY



AXIAL RELIEF ONLY

ANY COMBINATION OF AXIAL AND RADIAL RELIEF



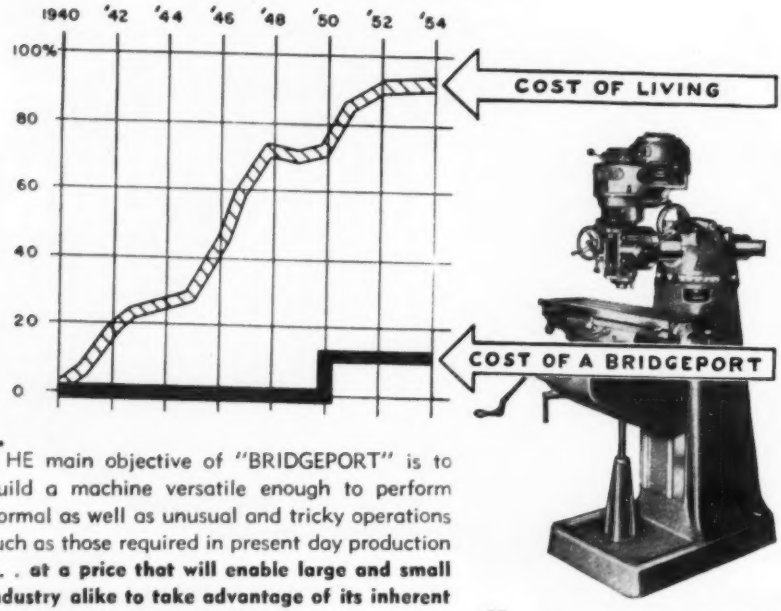
TAPS • SPHERICAL CUTTERS • PROFILE MILLS
REAMERS • COUNTERBORES • HOLLOW MILLS
CENTER DRILLS • STEP TOOLS • BORING BARS

Increased life, better performance for practically all end and side cutting tools is now possible. New design gives traverse, not rocking, action with tool remaining on wheel center. Set-up so fast and simple you can standardize on this better grind for tools of 1 to 16 flutes. Easy cam interchange – selective degree of relief without changing cams.

WRITE FOR CATALOG

GRINDER DIVISION
ROYAL OAK TOOL & MACHINE CO.
29600 STEPHENSON HY.
ROYAL OAK, MICH.

Holding the Price Line!



THE main objective of "BRIDGEPORT" is to build a machine versatile enough to perform normal as well as unusual and tricky operations such as those required in present day production . . . **at a price that will enable large and small industry alike to take advantage of its inherent and exclusive advantages.**

With quality and accuracy a prime consideration and never sacrificed to achieve a low selling price, we believe you will be interested in what has been made possible through modern tooling and machinery plus a cooperative supervisory and labor force in holding the price line of "Bridgeport Millers" over the past 16 years. The chart reproduced here tells the story far better than words.

IF prices of various commodities in every day use had increased no more than the price of the "BRIDGEPORT" . . .

you could buy the following today . . .

	. . . at these prices. .	. . . instead of these
Housing	$ 7,850	$18,000
Automobile	913	2,046
Food	727	1,500
Apparel	280	500
Fuel, Electricity	224	300

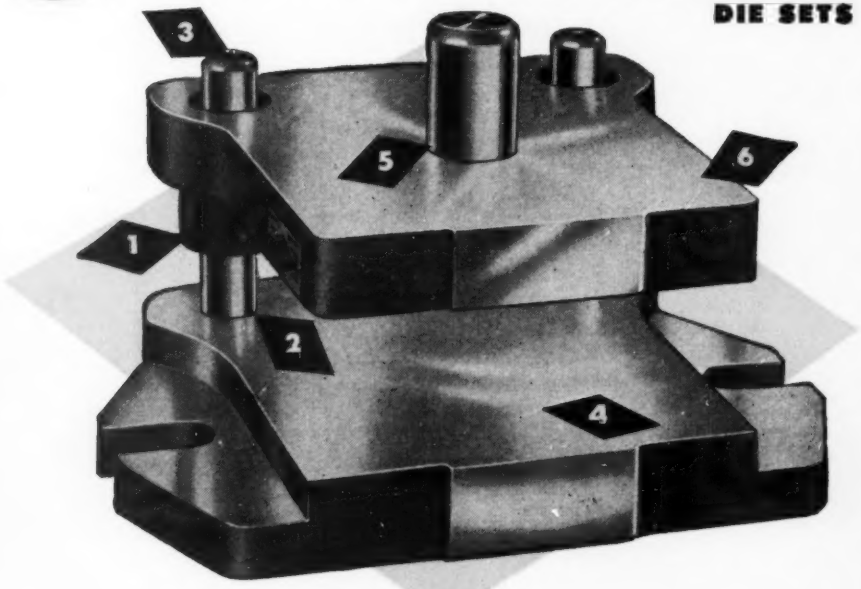
Ask your dealer. . . or us. . . to show you how "by holding the price line", shops both large and small have been able to modernize their production through the more than 20,000 "BRIDGEPORTS" shipped in the past 16 years.

Bridgeport **MACHINES, INC.**

Bridgeport, Connecticut

Manufacturers of High Speed Milling Attachments and Turret Milling Machines

6 reasons for buying..PRODUCTO DIE SETS



1. Bushings have an absolutely uniform inside diameter, resulting in full-bearing and extra long life.

2. New design die set gives added strength and assures accurate location of pin and bushing holes.

3. Accuracy of guide pins and bushings are checked on light guages reading to 50 millionths of an inch.

4. Parallelism and flatness held to close limits by rough machining prior to grinding.

5. Shank, cast as integral part of semi-steel die set, can be inserted or welded on all-steel sets.

6. Surface plates, accurate to within .0001", check flatness of ground surfaces and parallelism of die set.

To make an accurate die, an accurate die set must be used. For this reason, every Producto die set is an instrument of precision.

If planning a new die today, order your die set by the new Producto catalog — selection is easy, delivery is prompt.

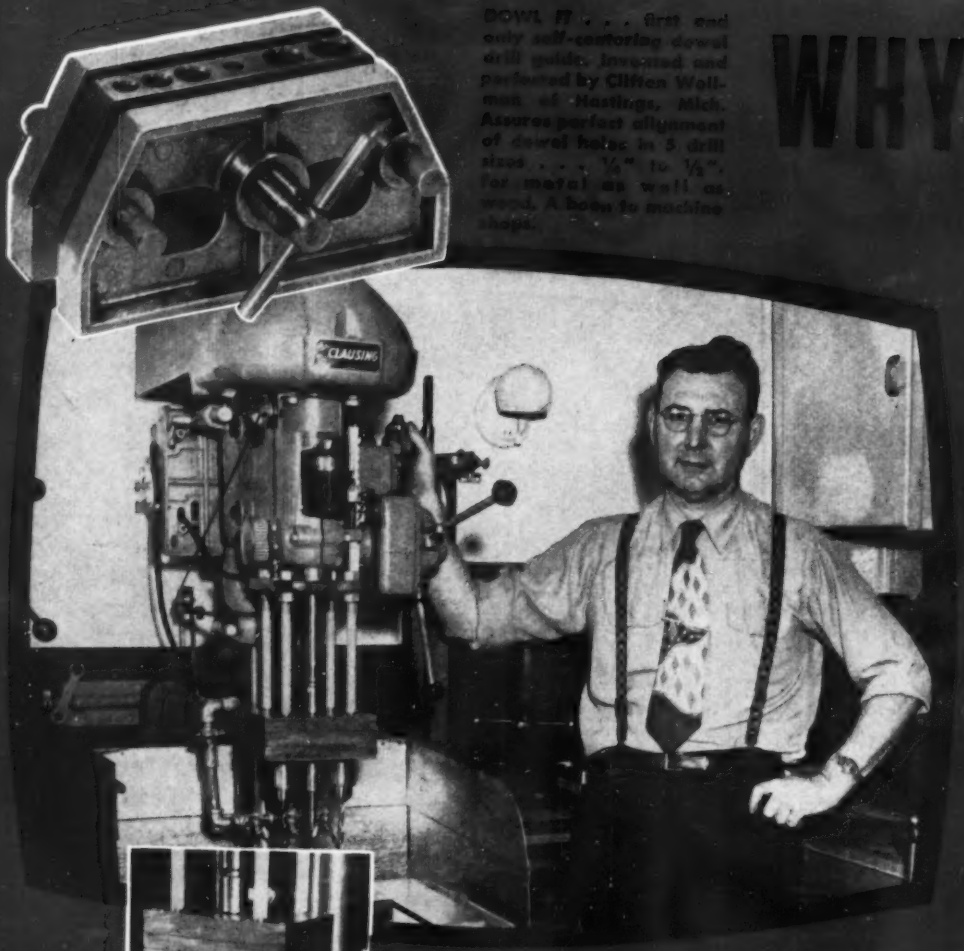
THE PRODUCTO MACHINE COMPANY
960 Housatonic Ave., Bridgeport 1, Connecticut

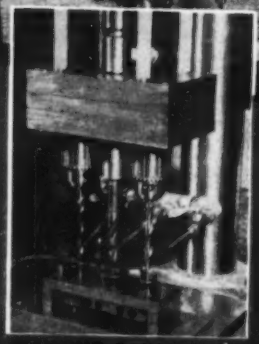
For Precision Die Sets *Fast* Call . . . PRODUCTO

ALSO MAKERS OF DIE ACCESSORIES, FEEDING EQUIPMENT, VISES, MACHINERY.

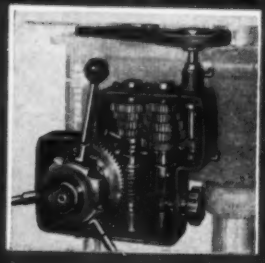
WHY

DOWL FIT . . . first and only self-centering dowel drill guide. Invented and perfected by Clifton Wellman of Hastings, Mich. Assures perfect alignment of dowel holes in 5 drill sizes . . . 1/4" to 1/2". For metal as well as wood. A boon to machine shops.





Wellman's big job was accurately **locating** and drilling guide holes and vise screw holes. To do this he designed and built his own multiple drill head, locating and drilling three holes in one operation and two in another. Three [illegible]



CLAUSING POWER FEED DRILL PRESS exactly suited Wellman's needs. Its blind ID tapped rack and pin assembly! The efficiency of CLAUSING'S proven feed with positive gear drive [illegible] all back [illegible] collars and shaft [illegible] heavy duty construction [illegible]

Wellman CHOSE THE 18" CLAUSING POWER FEED DRILL PRESS TO SPEED PRODUCTION OF SELF-CENTERING DOWEL DRILL GUIDES

Drilling ½" holes through 1-½" deep, ⅜" thick cold rolled, case hardened steel is a tough assignment for any drill press. By using a specially designed head with three permanently spaced chucks, Wellman does different operations on the same job with his CLAUSING, by changing the drill sizes and using two or three of the chucks. The combination of the CLAUSING and this head, speed his production about one-third. "My new CLAUSING really does a slick job," says Wellman, "and with POWER FEED the tough steel yields like butter."

Study these CLAUSING PLUS VALUES

Capactiy 1" in cast iron, ¾" in steel. 6½" spindle travel for efficient use of production chucks. 63/64" diameter spindle with choice of No. 3 M.T. nose, ¾" or 17/32" Jacobs chuck. 39" maximum distance spindle to table. 50" maximum distance spindle to base. Motor: ¾ to 1½ H.P. ⅝" B-section belt for efficient transmission of power. Speed range with 1725 RPM motor — 390, 650, 1100, 1850, 3000. With 1140 RPM motor — 250, 480, 800, 1200, 1950. Four ball bearing drive, with 3 sealed-for-life and 1 double-row, double-shielded ball bearings. Both races in double row bearing absorb drill thrust. Exclusive Vernier depth stop with control accurate to .001". Position mechanism, furnished, moves BOTH head and table. Double coordinate locks on head and table.

With POWER FEED — The Greatest CLAUSING Ever!

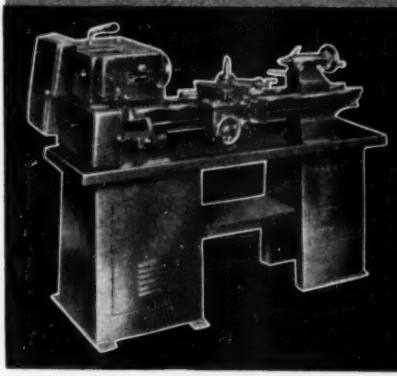
The new Plus Value CLAUSING 18" Drill Press sets new standards in tool and job capacity, and performance. And with POWER FEED it becomes an outstanding value for production, tool room or general drill operations. Its heavy-duty GEAR DRIVEN power feed is positive and sure with no belt slippage to dissipate power. Drive is through four sets of change gears, worm, worm gear. Instant feed selection by dial — no belts to position. Steel change gears with ½" face. Hardened stress-proof steel worm. Bronze worm gear with ¾" face. Gears run in bath of oil. Heavy-duty Oilite bearings, with ball thrust bearing on worm shaft.

Make any comparison you wish. But by all means COMPARE. Then your first choice is bound to be CLAUSING. Your experienced ATLAS-CLAUSING Dealer will gladly help you solve any special problems you may have.

Atlas CLAUSING *the* PLUS VALUE LINE

VERTICAL MILLER
Mills, Drills, Bores, Reams and Shapes at all angles with one work setup! Rigid, high precision spindle head with 7 ball bearings. Chrome nickel steel spindle. 6" x 24" table, 6 spindle speeds, 180 to 3250 RPM. No. 7 B&S or No. 2 M.T. spindle are optional.

NEW 12" LATHE
Features: "Zero-Precision" Timken tapered roller bearings • exclusive clutch and brake equipped countershaft • 1" collet capacity • 12" swing • 1⅝" hole • No. 3 M.T. tailstock • double-walled automatic apron • quick change mechanism • massive precision ground bed.



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CLAUSING DIVISION, QUALITY MACHINE TOOLS SINCE 1911 *Atlas Press Company*
11-107 N. PITCHER ST., KALAMAZOO, MICHIGAN
CLAUSING HEAVY-DUTY MACHINE TOOLS • ATLAS METALWORKING MACHINE TOOLS • ATLAS WOODWORKING POWER TOOLS

The sweetest story ever told – on AIR and HYDRAULIC POWER!

Hydraulic Cylinder Catalog 106 — Cushioned and non-cushioned, standard rod and 2:1 rod, single and double end rod, internal and external threads, all standard mountings in 2" to 10" bores. Offered for 1500 P.S.I., 3000 P.S.I.

Hydraulic Valve Catalog 204—4-way, 3-way, pilot, and remote valves in 6 operations, 4 actions, 7 sizes, 5 piston designs. Offered for 1500 P.S.I., 3000 P.S.I.

These five books, totaling 68 pages, are jam-packed with all the data necessary to lay out successful air and hydraulic circuits. 450 Rivett models, in a variety of sizes, are detailed—every standard air and hydraulic component offered in the industry. Description of each includes working drawings, specifications, and cut-away views. Easy to use, complete in information, these Rivett catalogs are a must on every board. Write to Rivett Lathe & Grinder, Inc., Brighton 35, Boston, Massachusetts.

450 standard Rivett models described!

— All the necessary components for any efficient circuit.

Hydraulic Power Unit Catalog 400 — Single, double and combination pump types. Single —.4 G.P.M. to 40 G. P. M. at 1000 P.S.I. Double—3.5 G.P.M. to 48 G.P.M. at 1000 P.S.I.

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Air Valve Catalog 303 — 4-way and 3-way, pilot and remote valves in 5 operations, 5 sizes. Offered for 150 P.S.I. service.

Rivett Lathe & Grinder, Inc., Dept. **MTB-11** Brighton 35, **Boston, Mass.** Please send me: ☐ Hydraulic Cylinder Catalog 106 ☐ Hydraulic Valve Catalog 204 ☐ Hydraulic Power Unit Catalog 400 ☐ Air Cylinder Catalog 55 ☐ Air Valve Catalog 303

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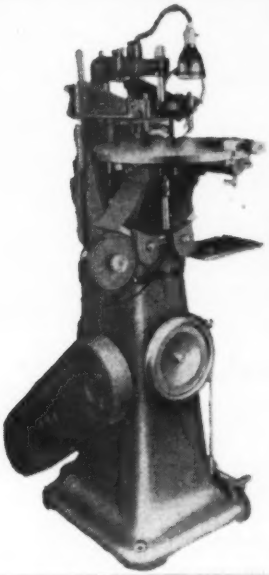
RIVETT **furnishes a complete power package**

VALVES • CYLINDERS • POWER UNITS

BANISH TOOLROOM INEFFICIENCY

with

OLIVER DIE MAKING MACHINES



In more than 10,000 installations throughout the world, OLIVER Die Makers have banished inefficiency in machine sawing, filing and lapping. Unsurpassed for nearly 40 years, OLIVERS have been found invaluable on such jobs as Production Filing, Experimental Work, Metal Patterns, Cams, Gages, Templates, etc.

OLIVERS simplify die making to the extent that expensive, hard-to-get skilled labor is not required . . . Coupled with this fact is their speed and accuracy . . . saving time and cutting costs up to 60%. And to top it all, OLIVER DIE MAKING MACHINES have such a long, dependable operating life that many have been kept in continuous use for more than 25 years.

OLIVER DIE MAKERS
Available in 5 Models

The Bench Model S-1 (illustrated) is a single speed die maker for use on tool steel up to 1" thick.

The Heavy Duty Model (illustrated) has 6 speeds, works in metal up to 3" thick, has variable strokes to 5" with hydraulic feed.

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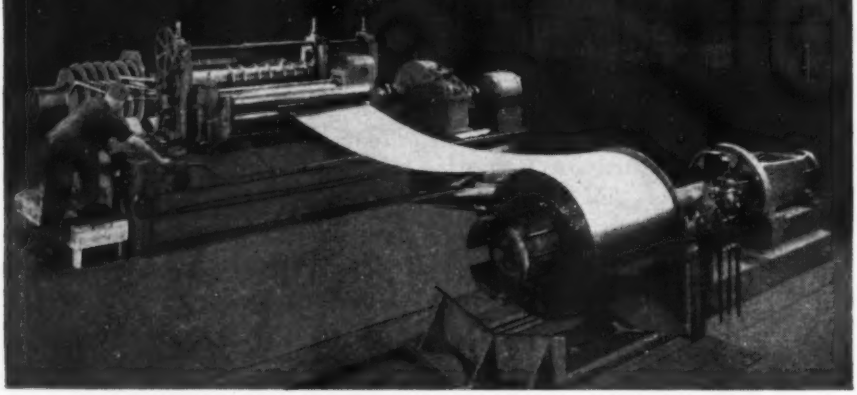

pay Four Kinds of Dividends!

If you use 100 tons or more of coiled strip or sheets per month, in special widths, the installation of a Yoder Slitter will pay four kinds of dividends:

1. Savings of $10 to $30 per ton by buying standard widths instead of slit strands. This saving alone often pays for the Slitter investment in a year or less.
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3. Greatly reduced inventory requirements. From a relatively small stock of standard widths you can meet your own needs for special widths in a few hours.
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Yoder slitters, uncoilers, recoilers and other accessories are made in many sizes and capacities, from the smallest to the largest. The Yoder Slitter Book is a treatise on the economics as well as mechanics of slitter operation—send for it.

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Taper boring tool

You can get your taper hole jobs done in a hurry and save set-up time, too . . . with the TREE TB-4. So versatile that it can taper bore up to 10" in diameter and can be used on your mill, jig borer or boring bar . . . Precision ground for accuracy . . . Simple to use.

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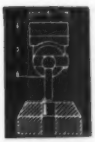

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The TB-4 can be used as an offset boring tool for jig and fixture boring.

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Faces up to 10" in diameter; graduated swivel base set at 90°.

OUTSIDE TURNING

Straight or tapered outside turning with the extension bar.

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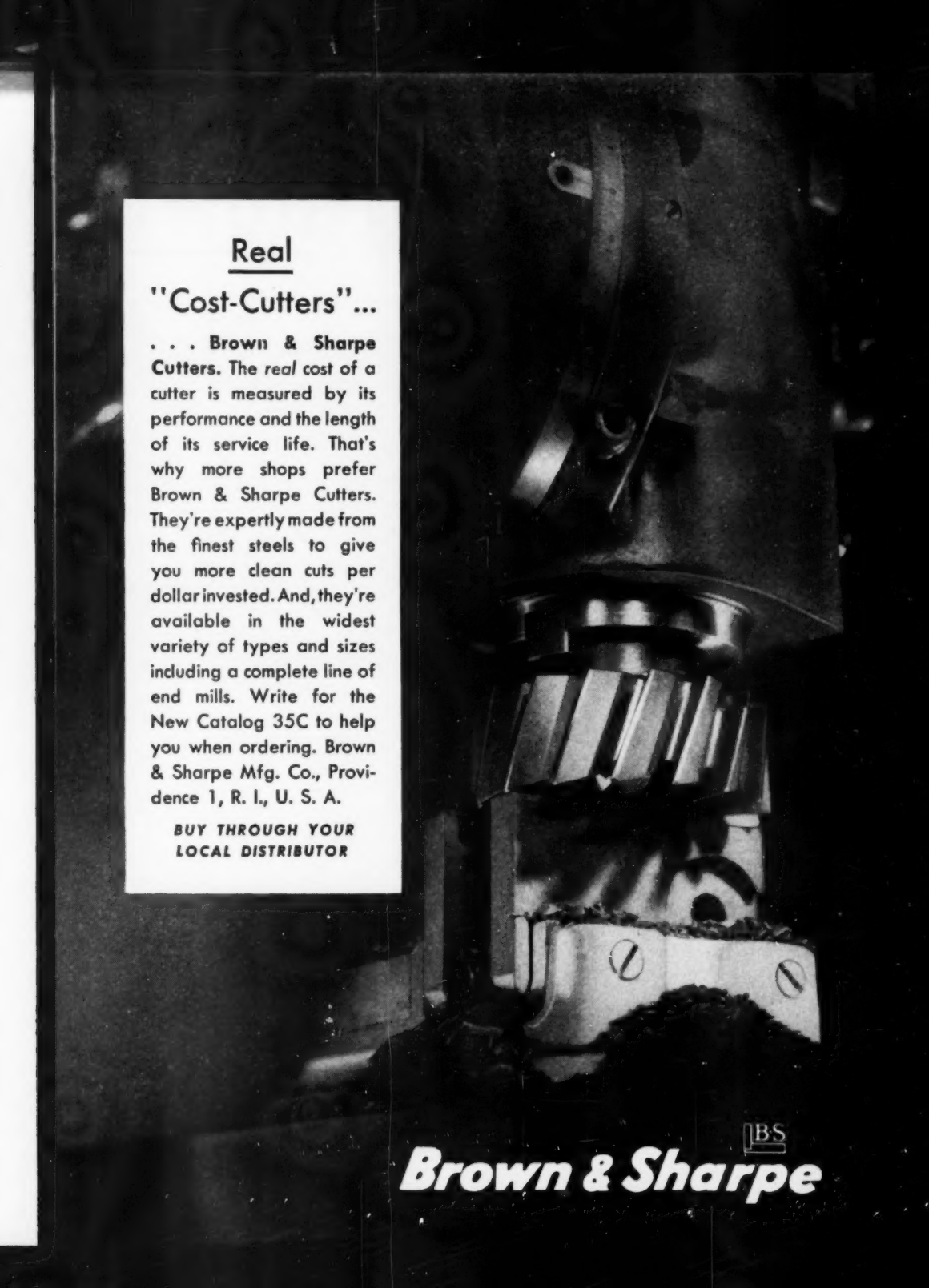
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This machine, working a 9½ hour day, forms light gauge sheets in mild and stainless steel up to ¼" thickness. It is constantly producing accurate parts for easy assembly of Century's baking ovens and bakery machinery.

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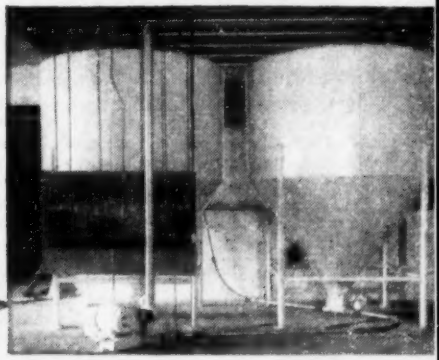

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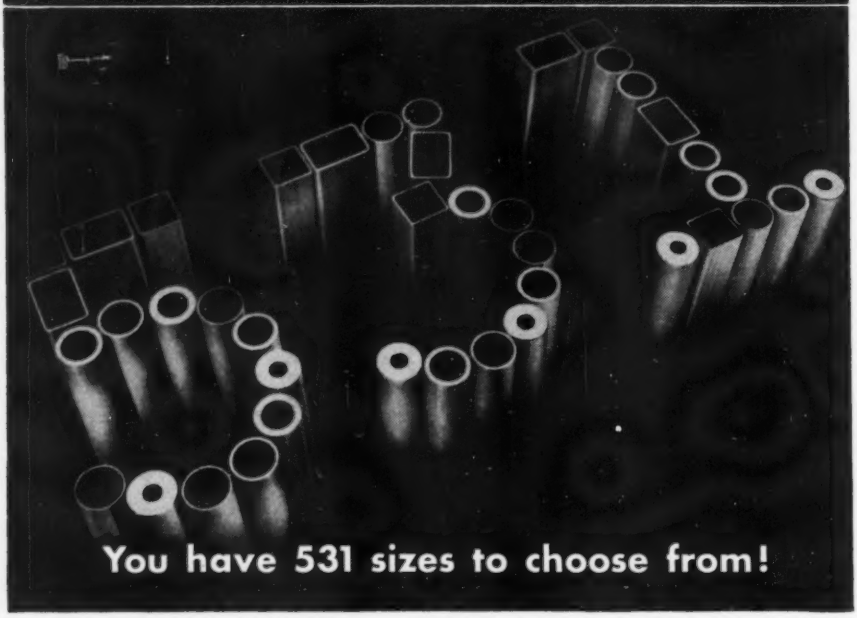

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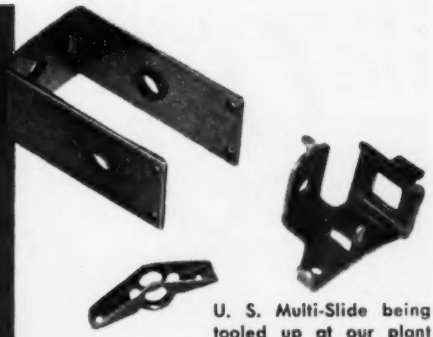
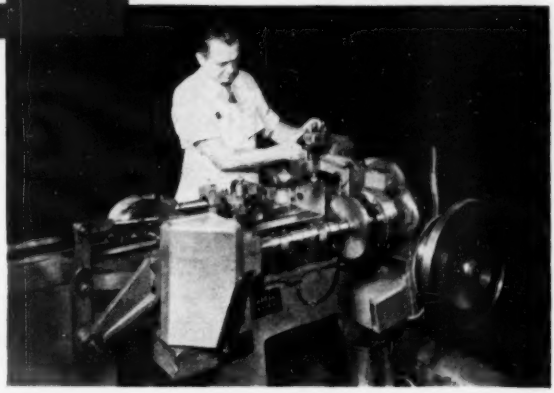
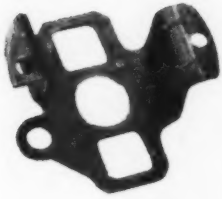
YOU CAN PRODUCE PARTS LIKE THESE ON THE U.S. MULTI-SLIDE



U. S. Multi-Slide being tooled up at our plant prior to shipment.





Bulletin 15-B contains complete specifications for all four sizes of U.S. Multi-Slide Machines. Ask for a copy.

These parts were tooled for production on U. S. Multi-Slide (R) machines by the General Tool and Engineering Company, Dayton, Ohio. They are produced complete — without secondary handlings — at profitable high production rates. The feed unit, ram, forming slides and vertical stripper (which are standard Multi-Slide equipment) make it possible to produce complicated parts to close tolerances at each stroke of the machine. The U. S. Multi-Slide may be tooled up to perform trimming, piercing, shearing, embossing, swaging and forming operations in a great variety of combinations. If you are making precision formed stampings, find out how U. S. Multi-Slides can help reduce labor costs, increase production and improve quality.

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AMPERE (East Orange) NEW JERSEY

Builders of U. S. Multi-Slides — U. S. Multi-Millers

U. S. Automatic Press Room Equipment—U. S. Die Sets and Accessories

THE "Q" LINE of HIGH Quality SPECIALIZED PNEUMATIC TOOLS

Automatic Thickness Router

Model LD-100

Where automatic cutting or chamfer operations are specified at specific tolerances, Quackenbush's automatic thickness router fills the bill. Designed exclusively for automatic operation, it is completely air operated and is self-lubricated by an air mist system. Routing thickness range is from .030 to .750 and is controlled by a calibrated micrometer feed.

The automatic thickness router weighs only 16½ pounds and is supported by the part which it is cutting. Plexiglass, phenolic resin and non-ferrous metals may be accurately cut within ranges of .030 to .750 at a rate of 3½ ft. per minute.

A special carbide insert cutter is required.

Standard flute lengths range from ½" to 2½" in ¼ increments.

Standard Chamber Cutters—carbide inserts in 45° and 60°.

Radius and grooving cutters are special.

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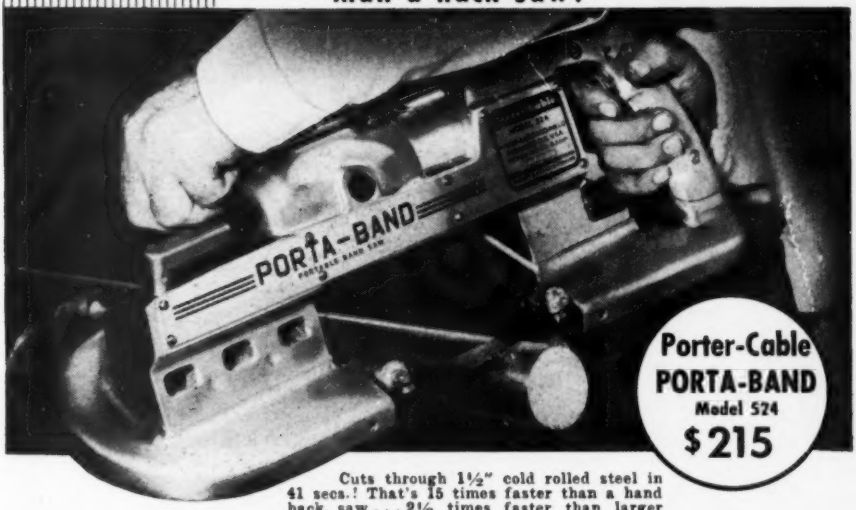
new Portable BAND SAW!

Cuts metal 15 times faster than a hack saw!



Cuts through 1½" cold rolled steel in 41 secs.! That's 15 times faster than a hand hack saw . . . 2½ times faster than larger power hack saws!

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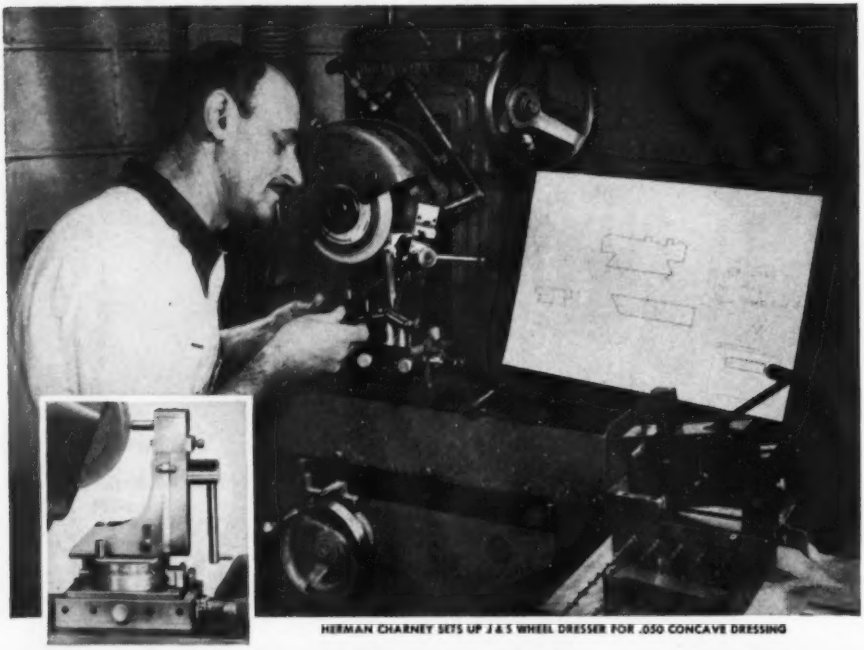

HERMAN CHARNEY SETS UP J & S WHEEL DRESSER FOR .050 CONCAVE DRESSING

Saves hours by setting angles in seconds, radii in minutes

A typical job made easier with a J & S "Fluidmotion" Wheel Dresser

Here's a wheel dressing job which calls for 13 angles, 4 radii, 7 flats. Ordinarily you might expect to spend from 5 to 30 minutes for each setting. With a J & S "Fluidmotion" Wheel Dresser, tool grinder Herman Charney made *all* 24 settings in just 21 minutes.

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An unusual case? No — it's typical of the speed and ease of operating a J & S Wheel Dresser. Setting 2 angles with a "Fluidmotion" Dresser, for example, takes only 10 seconds. Setting a radius takes only 2-3 minutes.

Note just *how* easy it is to operate a J & S Wheel Dresser. All you need is a micrometer and a simple hex wrench. You can forget about gage blocks, height gages and master gage settings. No need to bother either with parallel bars, surface plates or dial indicators.

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Accuracy? You can make concave and convex contours at a full 180 degrees with a guaranteed accuracy of 0.0001". J & S dressed forms, too, are always clean and precise. Angles and radii *flow* into each other, free of tool or chatter marks.

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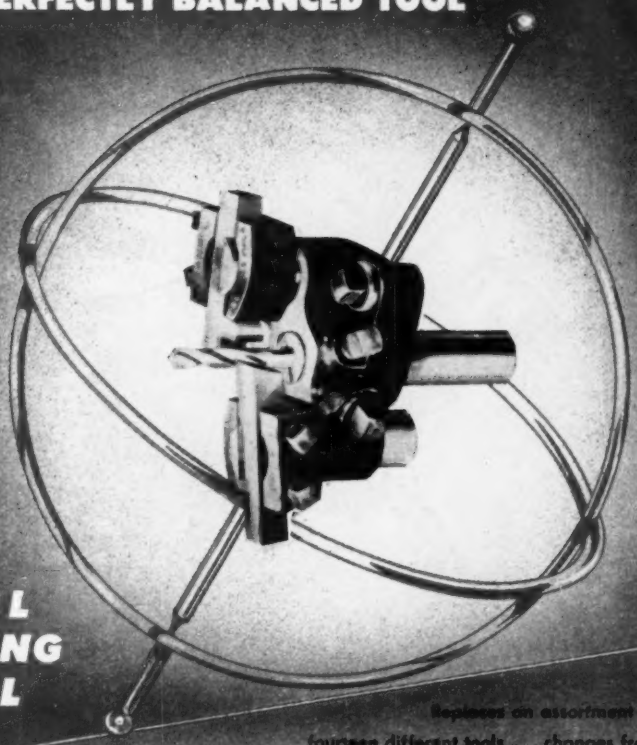

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Replaces an assortment of fourteen different tools . . . changes from right to left in ten seconds . . . no misalignment . . . extremely fine adjustment provided . . . for rough and heavy cuts as well as finishing cuts . . . The R and L TURNING TOOL is constructed with best possible care and of finest steel.

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do you have *OIL SEAL TROUBLES?*

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can solve them!

Here's a typical case where a shaft with ground surfaces was driven at a speed of 1750 r.p.m. The oil seals created enough heat to burn the shaft and stop the motor. To make matters worse, it was found that twice the original speed was necessary. So, the oil seal surfaces were *Superfinished,* and the shaft operated at a speed of 3500 r.p.m. With the *Superfinished* surfaces, no heat was developed at this higher speed. No further trouble was encountered.

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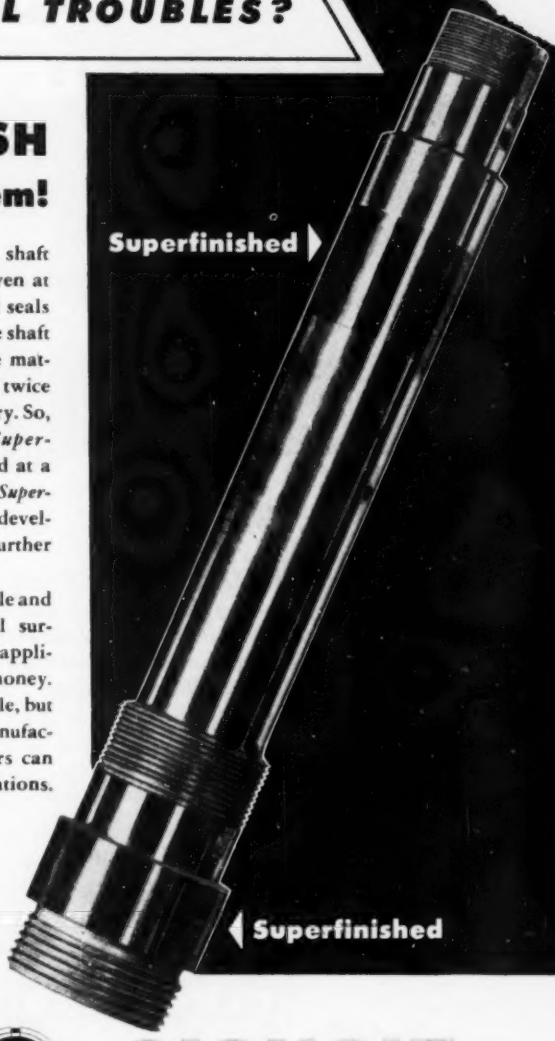

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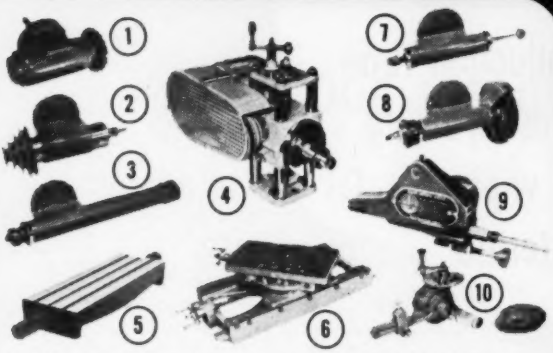
Increase Production on
LATHES, TURRETS, MILLS



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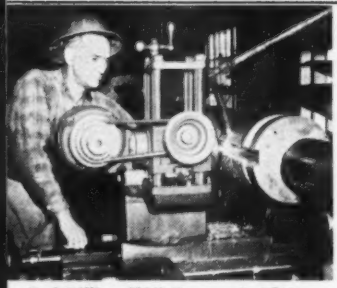
Build Special Production Machines with Master Heads and Independent Feeding Mechanisms! Save Time and Money by Relieving Your Independent Machines!

The Master attachment can be used profitably on many production operations. Mount it on your present equipment, lathes, turrets, mills, or use independently to perform additional operations in the same set-up. The basic milling unit with the above types of precision heads gives you facilities for milling, grinding, thread milling, boring, drilling, indexing, slotting, and keyseating, internal and external. Performs all operations for maintenance, tool room, and production at a minimum investment.



End Milling 2½" Keyway in 9⅞" Diameter shaft 22-ft. Long

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Model "B" ½ or ¾ H. P. — 13" to 18" Lathes
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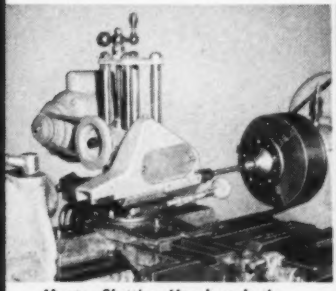
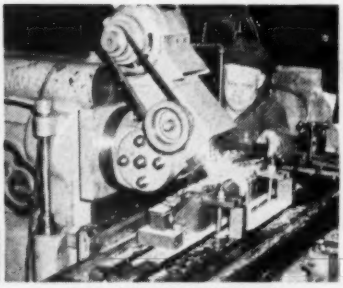
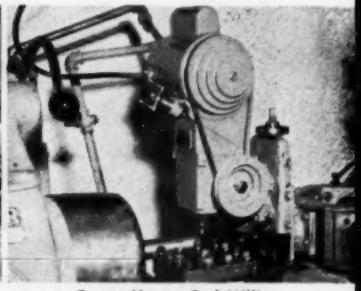
For the cost of one single-purpose machine, you can have several Master units producing. *Prompt deliveries!*



Master Slotting Head on Lathe Cutting Internal Taper Keyway



Geared Vertical Mill Head on a Horizontal Mill



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FREE

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...Another good reason for switching to **Scott Wipers!**

Instead of having to leave the job to get clean wiping material, workers keep a box of Scott Wipers next to them all day long. This simplified system of distribution and control saves valuable production hours.

Scott Wipers are sanitary, disposable. They end the laundering problem . . . and they greatly reduce the costly scratches and digs in finished work caused by chips lodged in wiping materials.

Whatever you're using now—compare them with Scott Wipers for cost, convenience, performance.

Your Scott representative or distributor will help you set up a production-line demonstration. Call him or mail the coupon today.

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Please send me full information on Scott Industrial Wipers.

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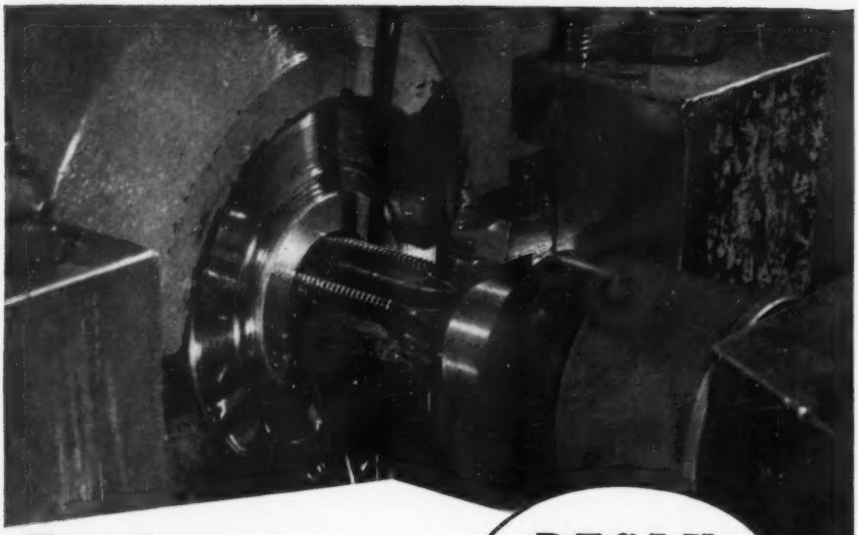

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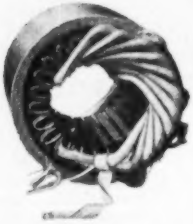

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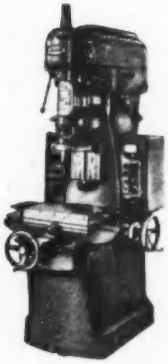

No. 2 MOORE JIG BORER, with its accurate lead screw settings within .0001", offers all the time-proven precision features associated with Moore Jig Borer construction for 15 years, plus numerous labor-saving advantages, including: increased capacity and size; infinitely variable spindle speeds; 3 power feed ratios; centralized controls.

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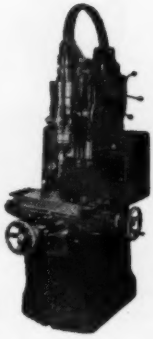
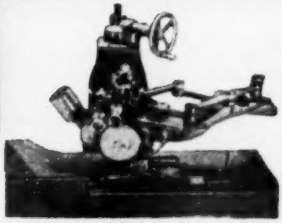


Four ways to cut costs and meet competition by mechanizing your toolroom.

No. 1 MOORE JIG BORER remains in the line. For its range—table working surface of 10" by 16" and cuts up to 3½"—this machine is still an ideal buy. There are over 1300 satisfied users. We will continue to offer it for the many situations where a small, accurate jig borer fills the required prescription.



MOORE PANTO-CRUSH WHEEL DRESSER speeds form-grinding and cuts costs. Both crush-forming and diamond-dressing are accomplished with this 2-in-1 unit permanently mounted on the wheel spindle of a surface grinder. You switch from one method to the other without disturbing workpiece setting.

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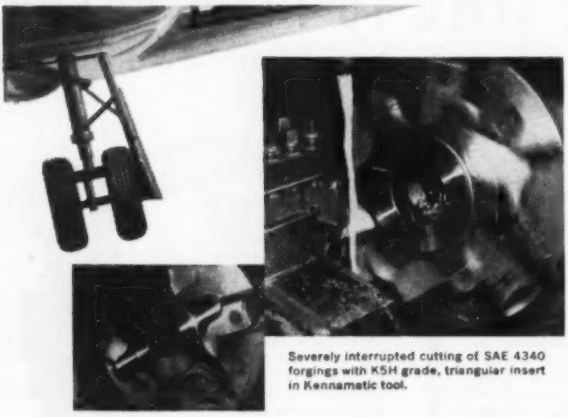
K5H—a performance report on another Kennametal grade with ideas you can use to cut machining costs



Severely interrupted cutting of SAE 4340 forgings with K5H grade, triangular insert in Kennamatic tool.

K5H grade insert tools successfully face aircraft forgings heat treated to 220,000 psi tensile

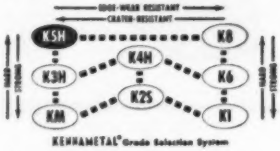
These tough, heat-treated SAE 4340 steel landing gear parts, heat treated to 220,000 psi tensile strength (Rockwell 47C), require severe jump cutting operations.

Using various grades of standard brazed tools, the Menasco Manufacturing Company rough and finish faced both sides at 87 RPM and .0035-inch feed. Even at this relatively low speed and feed, tool life was only two to four pieces per grind. Three cuts were necessary on each side of the forging. Approximately 6.35 minutes were required to change these tools—15 minutes to regrind them.

With K5H inserts in Kennamatic* tools, these forgings are now faced at 150 percent greater speed and twice the previous feed. Only two cuts are required on each face. Rotating the insert to a new cutting edge takes 45 seconds. Since three cutting edges are available on each end of the triangular insert, both sides of 54 pieces are faced before regrinding is necessary. Both ends of the insert are reground in 10 minutes.

K5H is the hardest of the Kennametal* grades. It is highly resistant to cratering, abrasion, galling and pick-up and is available in solid tools and inserts for precision boring and fine finishing of steel at high speeds. K5H is very strong for such a hard material.

The Kennametal Grade Selection Guide (below) offers you a simplified method for pin-pointing the exact grade of carbide that will assure top tool performance on every machining job. It shows that K5H is the hardest, most crater-resistant of the Kennametal grades. If this grade is being used and cratering is no problem, a change to K8 will provide greater edge-wear resistance. Or, if additional strength is desirable, K3H will improve tool life.



Tool breakage, chipping, excessive edge or top surface wear, heat checks and other causes of poor tool performance indicate a need for tool wear analysis. A Kennametal Tool Engineer is ready to help you with these problems . . . to help you select the best grade and tool for any job. In addition to his own broad experience, he has available to him the backgrounds of 150 other Kennametal Tool Engineers. He's as near as your telephone. Call him, or write to KENNAMETAL INCORPORATED, Latrobe, Pennsylvania.

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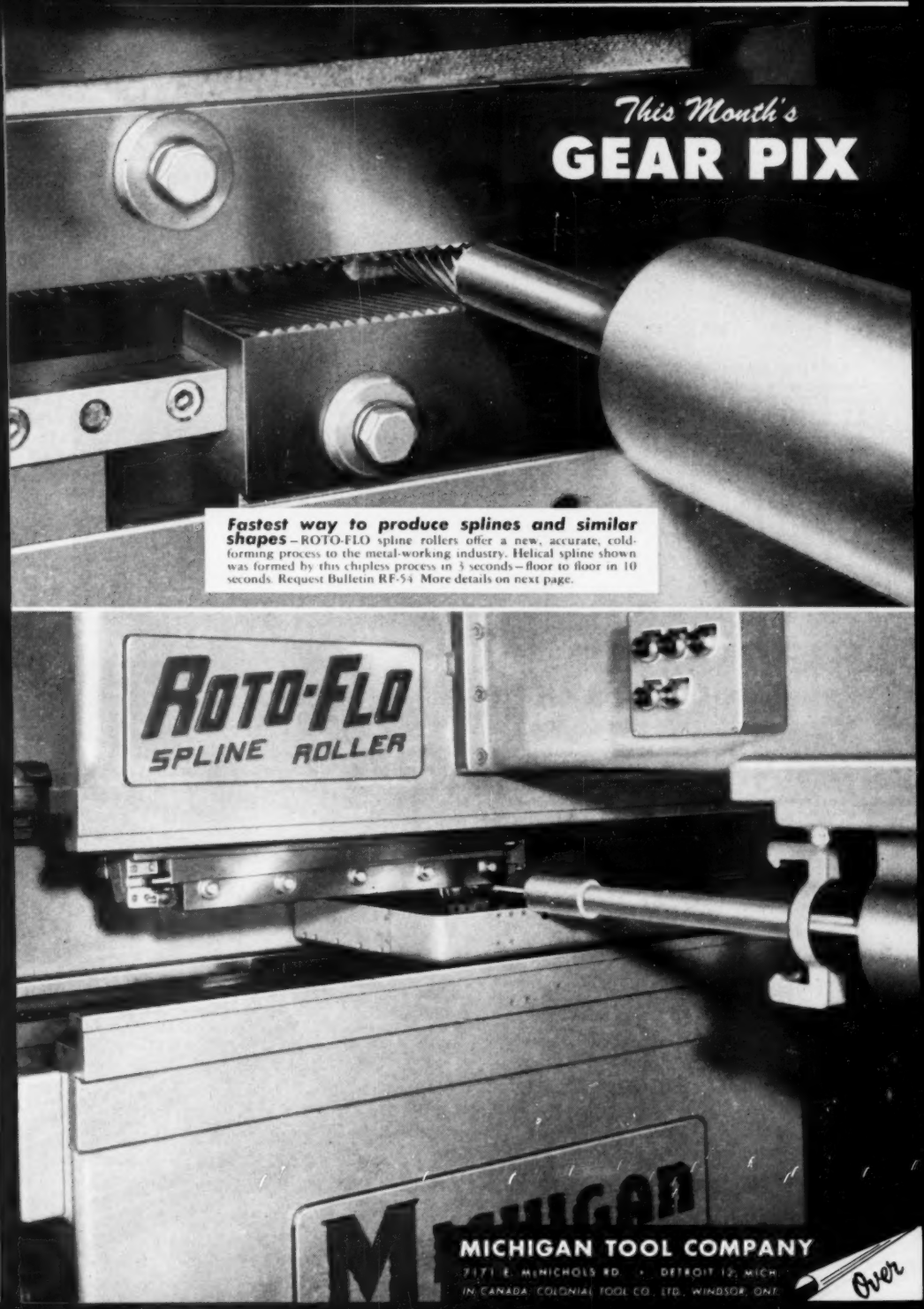
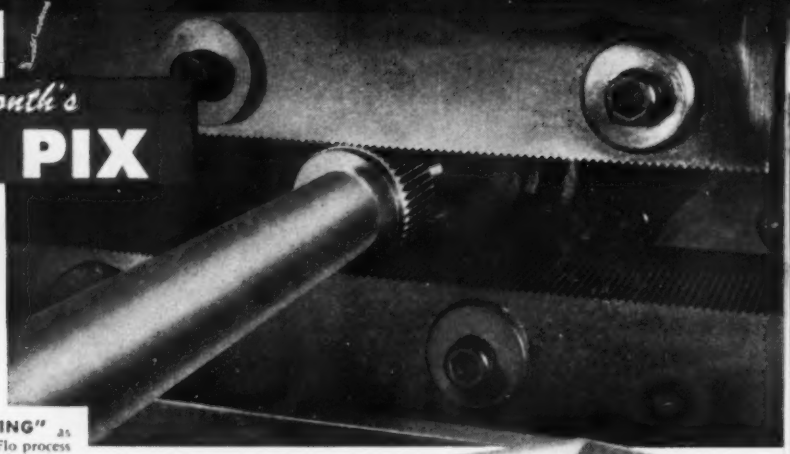
INDUSTRY AND KENNAMETAL ...Partners in Progress



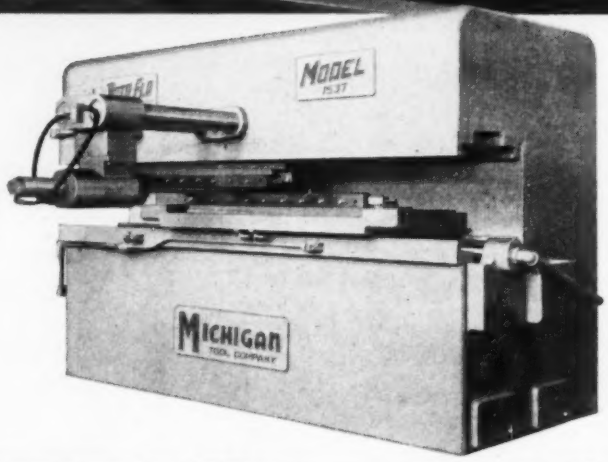
Fastest way to produce splines and similar shapes – ROTO-FLO spline rollers offer a new, accurate, cold-forming process to the metal-working industry. Helical spline shown was formed by this chipless process in 5 seconds – floor to floor in 10 seconds. Request Bulletin RF-54. More details on next page.

This Month's

GEAR PIX

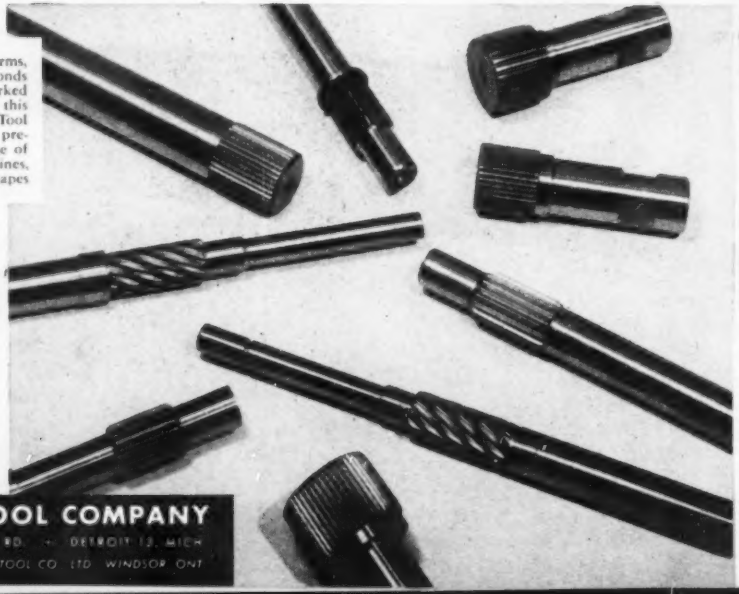


"CHIPLESS MACHINING" as accomplished by the Roto-Flo process —a straight spline is being formed as it is rolled between the two forming racks. Roto-Flo produced parts have excellent surface finishes and are formed to close dimensional tolerances.



ONE of the standard models offered in the *Roto-Flo line is the 1537 with a capacity for rolling parts up to 2 inches in diameter. The stroke on these machines is variable, depending upon the size of the forming rack required for the part being produced.

SPLINES and other "tooth" forms, can be formed in a very few seconds by the Roto-Flo process, at a marked reduction in cost. As illustrated, this latest development by Michigan Tool Company in "chipless machining" presents designers with a new range of flexibility when specifying splines, serrations, and other similar shapes on external parts.



*Patent Pending

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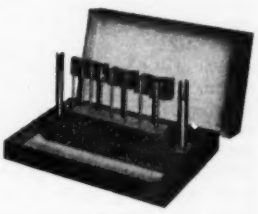

Kit of Situft Brushes and holders is available. Variety of brush sizes to suit various applications. Write for bulletin on Osborn Situft Brushes.

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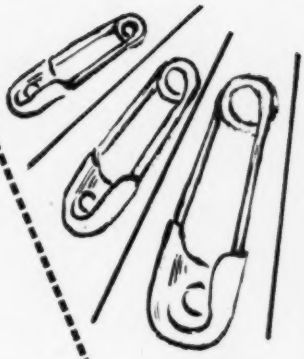

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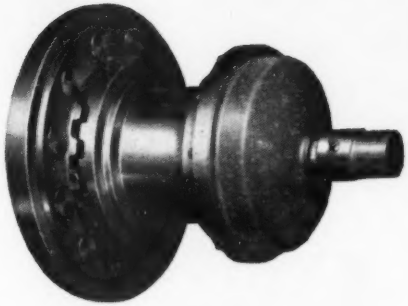

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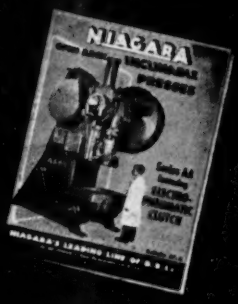

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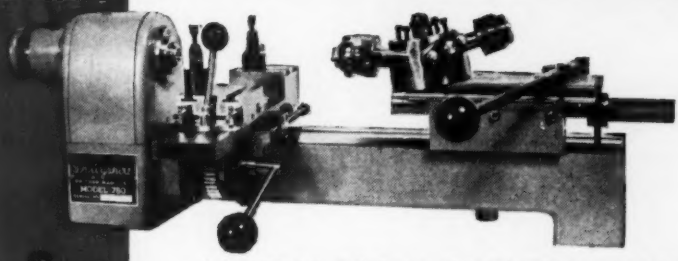
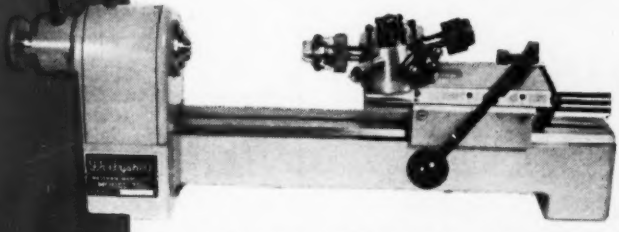


Lathe, 22" bed, Ball Bearing Headstock with Lever-Collet Closer, Pt. No. 3804, with Double Compound Slide Rest, Pt. No. 3652 and Six-position, self-indexing and semi-automatic Turret, Pt. No. 3610.



Lathe, 22" bed, Ball Bearing Headstock with Lever-Collet Closer, Pt. No. 3804, with Six-Position, self-indexing and semi-automatic Turret, Pt. No. 3160.

SPECIFICATIONS

Overall Length With Lever Chuck Closer	25"
Length of Bed	22"
Height to Top of Headstock	8½"
Height to Top of Lathe Bed	4"
Width of Bed	2⅞"
Width of Ways	1-13/16"
Swing over Bed	5.905" (15 cm)
Swing over Compound Slide Rest	2¾"
Distance between Centers	12"
Center Height	2.953" (7.50 cm)
Maximum Collet Capacity	.315" (5/16")-(No. 80 metric)
Maximum Spindle Speed	18,000 RPM
Concentric Running of Ball Bearing Headstock Spindle	.0002"
Spindle Speeds with Variable Speed Drive:	
With Pulley Ratio 1 to 1	600 to 5,000 RPM
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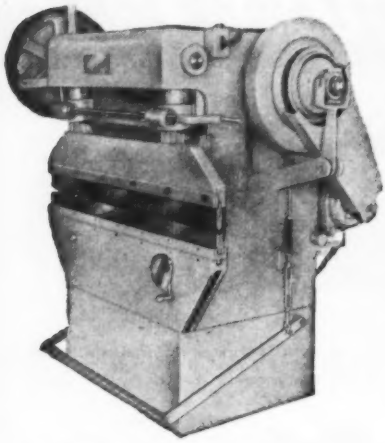

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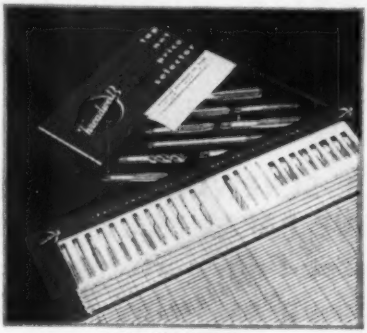

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NEW THREAD GAGE SELECTOR—a complete pocket-size tabulation of basic data for thread plug and ring gages, both fractional and numbered sizes from No. 0 to 1½".

NEW NET PRICE SELECTORS—provide quick data on all standard taps, dies, tap and die kits, counterbores and keyway broaches; simply pick the size and style wanted and get the net price instantly.

Ask your Threadwell distributor for these two new members of the Threadwell service family. Ask him too about the long service life of Threadwell's fine cutting tools and gages.

ADJUSTABLE ROUND, 2-PIECE & HEXAGON DIES

KEYWAY BROACHES & SETS

COMPLETE LINE OF HIGHEST PRECISION GAGES

THREADWELL DISTRIBUTORS, too, are strategically located to serve you promptly, properly, and well.

THE FINEST IN CUTTING TOOLS & GAGES

LET US ADAPT-

DPS MODERN ASSEMBLING EQUIPMENT

to Your Individual Needs

DPS POWER SCREWDRIVERS *and* SELECTIVE PARTS FEEDERS will give you outstanding performance: greatly stepped-up assembly speed, lower costs, accuracy and uniform results.

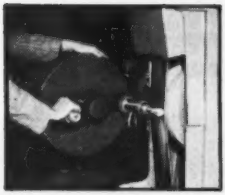
Below — a very small portion of the more than **10,000 Applications** we have done for others, We can do the same *for You!*

WRITE FOR NEW CATALOG AND BROCHURES

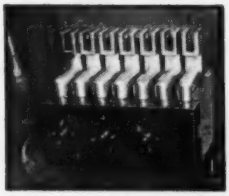
DETROIT POWER SCREWDRIVER CO.

2809 W. FORT ST. DETROIT 16, MICHIGAN

Do your machining up to 10 times faster!

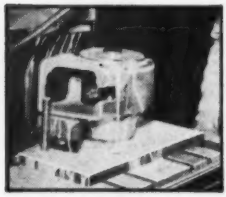


• Originally turned on lathe, now rough and finish-ground at 600 per hour.



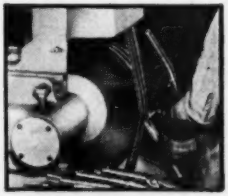
• These pieces formerly *milled* now belt-ground 5 times faster.

• Grinds broad areas flatter and faster than *radial surface grinder.*



• This grinding operation 100% faster than former *milling* time.

• Generates 2 radii at double the output by *hand filing* and *polishing.*



• Replaces *polishing jack* — eliminates costly setting up of glued wheels.

Porter-Cable ABRASIVE BELT GRINDERS

Abrasive Belt Grinding removes stock rapidly, provides fine finish free of tool marks. Greatly simplifies fixtures — or eliminates them entirely. (Often makes hand presentation possible.) Is up to 10 times faster than milling, shaping, polishing or ordinary grinding — frequently saves 75% to 90% of previous set-up time.

Wet-belt or dry-belt models (determined by material to be worked) available for flat surfacing, contour grinding, centerless grinding, generating radii, beveling, burring and polishing.

Let us prove that an Abrasive Belt Grinder can reduce the cost of many operations. Send us sample pieces for recommendations — or ask to have one of our production engineers discuss your problems at your convenience, at your plant. Free 32-page case history booklet on request.

Grinders for every application

Announcing . . .

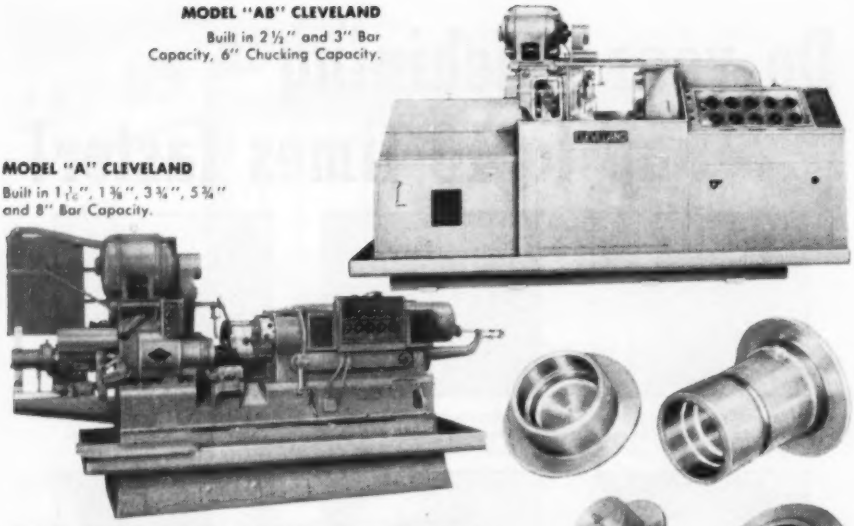
Porter-Cable Abrasive Belt Grinders are now made and sold by Engelberg Huller Co., Inc. — manufacturers of precision machinery since 1888.

The ENGELBERG HULLER CO., INC.

811 West Fayette Street — Syracuse, N. Y.

MODEL "AB" CLEVELAND
Built in 2½" and 3" Bar Capacity, 6" Chucking Capacity.

MODEL "A" CLEVELAND
Built in 1 1/16", 1⅜", 3¾", 5¾" and 8" Bar Capacity.



THESE CLEVELAND AUTOMATICS TEAM UP TO PRODUCE *77 jet engine components*

A total of 11 *Clevelands*—Model "A" and Model "AB" Single Spindle Automatics—form the production team selected by one of the nation's leading jet-engine manufacturers to produce 77 separate jet-engine components—a fitting testimonial to the versatility, flexibility and economy of production inherent in these modern *Cleveland* Screw Machines!

Why were *Clevelands* selected? Because they perform a broad range of machining operations without costly, complicated tooling. Because their range of feeds and spindle speeds is ideal for this type of production—parts range in materials from tough steels to aluminum and magnesium machined from bar and extruded stock. Because set-up time is *profitably short*. Model "A" and Model "AB" *Clevelands* are equipped with Electric Feed Drive—a *Cleveland* exclusive. Highly accurate forward and return turret tool feeds are set simply by positioning dials on the control panel. There are no cams to change—no time-wasting set-and-try mechanical adjustments necessary. Producing widely varying quantities of 77 different parts makes quick set-up an absolute necessity.

These features explain why leading manufacturers rely on *Cleveland* Automatics for truly economical parts production. Why not investigate their cost-cutting advantages for *yours*? Call in a *Cleveland* Field Engineer for complete details.

The parts illustrated are among the 77 jet-engine components being turned out on three 3" Model "AB", three 3¾" and five 5¾" Model "A" *Cleveland* Automatics . . . thus solving an involved parts production problem of a famous jet-engine builder with a "one-stop" call at CAMCO!

Remember: *Clevelands Cut Costs*

4934 Beech Street
Cincinnati 12, Ohio

SALES OFFICES: CHICAGO
CLEVELAND • DETROIT
HARTFORD • S. ORANGE

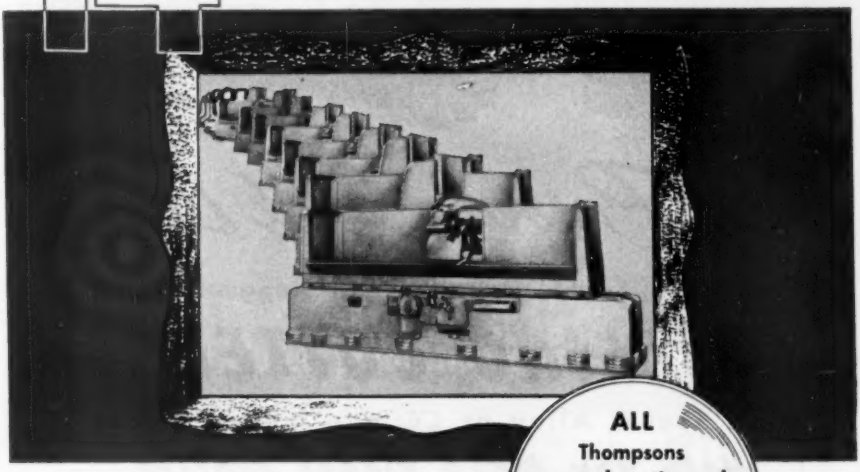
THE CLEVELAND AUTOMATIC MACHINE COMPANY

Manufacturers of a Complete Line of Single Spindle Automatic Screw Machines and High Pressure Hydraulic Die Casting Machines

LOOK CLOSELY AT THIS PICTURE
OF GRINDER PRODUCTION AND SEE WHY...

14 is a lucky number

for a manufacturer requiring precision grinding



ALL Thompsons operated continuously with much LESS DOWNTIME

that's why

it will pay you to invest in

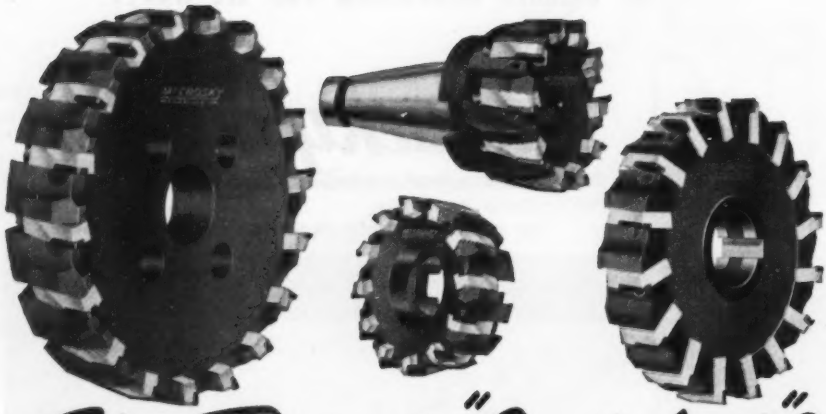
Thompson Grinders

After twelve years continuous manufacture of precision ground products, ten Thompson Surface Grinders proved so efficient and economical that this manufacturer ordered four more machines.

Thompson Grinders are available in a wide range of types and sizes from 6" x 18" to 72" x 384" to meet all production, special or tool room grinding requirements. The Thompson line includes machines from giant Hydrial Way Grinders to automatic Truform Jet Blade Contour Grinders, Dual Rotary Grinders and Broach Grinders.

CONTACT THOMPSON TODAY FOR HELP WITH YOUR MACHINING PROBLEMS

THE THOMPSON GRINDER COMPANY
Springfield, Ohio



Shop Proved "Jack Lock"®

Face, Shell, Shank, Half-Side and Staggered Tooth

MILLING CUTTERS

High Speed, Alloy or Carbide Tipped Blades

Help You Make Bigger Profits

● Engineered to meet modern milling practices—McCrosky Jack-Lock Milling Cutters combine the rigidity of solid tools with the greater economy — longer life — the easy, positive locking of each blade, without hammering — and the quick release and accurate blade adjustment of McCrosky shop-proven nationally recognized Jack-Lock Wedge.

Department superintendents, foremen and operators have found that there's nothing better or cheaper, than McCrosky Milling Cutters. You can't keep competitive with less. Why gamble? *Write for Bulletin 17-M today.*

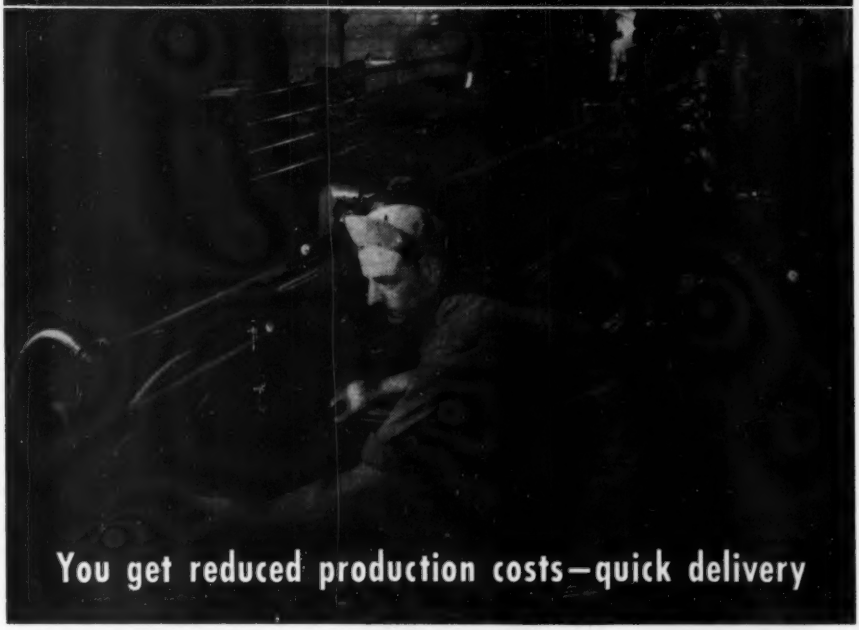
COLT CUTTING TOOLS

McCROSKY TOOL CORPORATION

MEADVILLE, PA.

Engineering and Sales Representatives in the Principal Cities

WHY IT PAYS TO BUY MX SCREW STOCK FROM US



You get reduced production costs—quick delivery

● Hundreds of shop cases have shown that USS "MX" free-machining bar stock cuts unit costs considerably . . . an average of 10% to 15%, sometimes as high as 42%. And the more machine work your parts require, the greater the savings.

Here's how you cut costs when you use "MX" rather than other free-machining grades. You get more parts per hour, longer tool life with less down time for grinding and adjustment, fewer rejects, closer tolerances and better part finish.

One of our qualified sales representatives will gladly discuss the advantages of "MX" with you as they apply to your particular shop requirements. And you can always depend upon quick delivery from the nearest U.S. Steel Supply warehouse.

In addition to "MX" stock, we carry: cold finished rounds, squares, hexagons, flats and precision shafting in all grades.

TRIPLE SECURITY

What you want
When you want it
At the right price

U. S. STEEL SUPPLY
DIVISION

General Offices: 208 So. La Salle St., Chicago 4, Ill.
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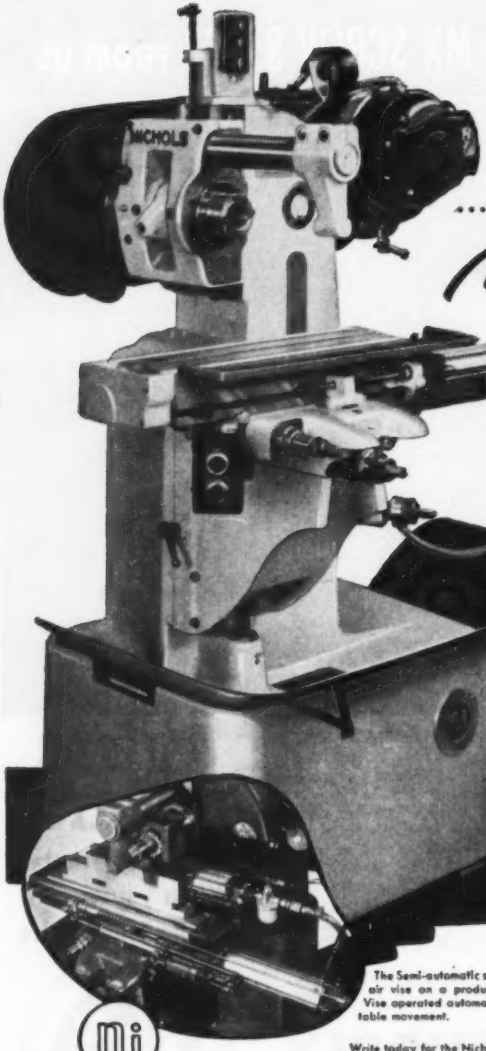
USS STEEL
UNITED STATES STEEL

UNITED STATES STEEL



pneumatic feed—for speed ...on the SEMI-AUTOMATIC

Nichols Miller

In selecting the Nichols Miller with pneumatic table feed, you obtain precision and a high-production semi-automatic machine. The push-button controlled power feed is entirely automatic — leaves the operator free to merely load and unload the work. Often he may run two or three millers with ease. The air cylinder works against the cutter and the hydraulic cylinder — completely eliminating chatter and table jump. The unit provides rapid advance from loading position to the cutter, infinitely variable cutting feed, and rapid return to loading position. Also available with power vertical feed to spindle head. If you want high production to "tenths", investigate the Nichols Semi-automatic!

"the miller that uses its head!"

CONDENSED SPECIFICATIONS

Table Working Surface	4¼" x 21"
Longitudinal Travel	
Pneumatic	9"
Cutting Stroke	5⅛"
Hand Screw (Optional)	10"
Transverse Travel	7"
Vertical Travel — Knee	13½"
Rise and Fall of Spindle	4½"
Selective Speed Ranges up to 5000 R.P.M.	
Weight	1250 lbs.

The Semi-automatic set up with air vise on a production job. Vise operated automatically by table movement.

Write today for the Nichols general catalog, which describes the six models of Nichols Millers. A sound, color movie, "the Miller that Uses its Head" is available for free showing. May we reserve it for you?

MANUFACTURED BY W. H. NICHOLS COMPANY WALTHAM, MASSACHUSETTS

NATIONAL DISTRIBUTORS **NICHOLS-MORRIS CORPORATION**

76-6 MAMARONECK AVE. WHITE PLAINS, N. Y.

NEW! THE ROTOR B-7 VERTICAL

AIR GRINDER AND DISC SANDER

MORE POWER PER POUND
than any other tool of its type!

FOR sanding, cup wheel grinding, wire brushing, cut-off work.

FEATURES. Light weight... easy to handle. Positive, direct-acting governor... less maintenance, safer. Dead handle can be removed for fast, one-handed operation on "feathering" jobs.

Available with two types of handles... straight (shown above) or safety (shown at right).

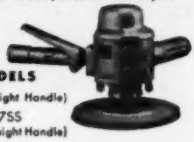
Has automatic built-in oiler.

ASK FOR CATALOG 47

Here's the featherweight with the heavyweight punch.

SPECIFICATIONS

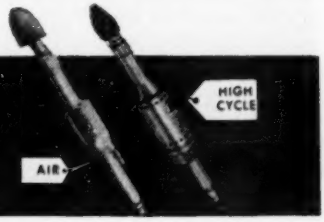
WEIGHT 6¾ lbs.
HEIGHT 7 inches overall
SPEEDS 8000, 6000 or 4500 rpm.



MODELS

B-7S (Straight Handle)
B-7SS (Safety Straight Handle)

THE ROTOR TOOL CO.
CLEVELAND OHIO

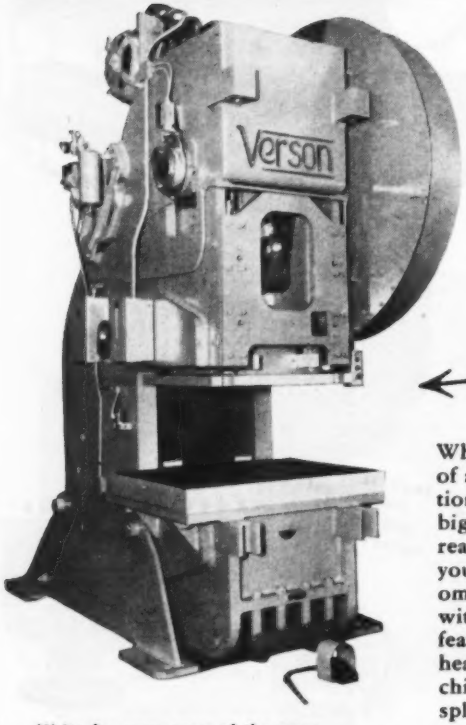


You get *BIG* press standards of construction and performance

in

Verson

O. B. I.'s



When you can combine the versatility of an O.B.I. press with the construction and performance standards of big, expensive machines, you get a real production tool that will give you the best possible long term economy . . . And that's just what you get with Verson O.B.I.'s. Just check these features—gears running in oil . . . heavy all-steel welded frame . . . machine cut steel gear and pinion . . . split cap main and crankpin bearings . . . mechanically interlocked pneumatic clutch and brake unit . . . full electric controls . . . many others.

Write for your copy of the new Verson Open Back Press Catalog. It's just off the press.

Verson

ORIGINATORS AND PIONEERS OF ALLSTEEL STAMPING PRESS CONSTRUCTION

VERSON ALLSTEEL PRESS CO.

9303 S. Kenwood Avenue, Chicago 19, Illinois
So. Lamar at Ledbetter Drive, Dallas, Texas

MECHANICAL AND HYDRAULIC PRESSES AND PRESS BRAKES • TRANSMAT PRESSES
TOOLING • DIE CUSHIONS • VERSON-WHEELON HYDRAULIC PRESSES

Tool Grinders by Ex-Cell-O

STYLE 44-A, Ex-Cell-O Precision Carbide Tool Grinder. A new model for sharpening single point tools. Inbuilt motor precision spindle. Ample pressure coolant flow.

FOR CARBIDES— CAST ALLOYS— HI-SPEED STEELS

A complete line of grinders, for efficient and economical sharpening of single point tools. All are double-end models using cup type wheels; with large tool rest tables, easily adjusted.

WRITE FOR THIS BULLETIN

It shows and describes five models; also gives important data on tool grinding. Write today to Ex-Cell-O in Detroit for Tool Grinder Bulletin.

EX-CELL-O CORPORATION
DETROIT 32, MICHIGAN

XLO
EX-CELL-O for PRECISION

54-40

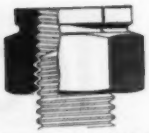
This portable electric hammer is completely self-contained. So are the FLEXLOCs that hold it together, even under the intense impact vibration induced by the rapid hammering action.

FLEXLOCs chosen to withstand vibration of 3000 hammer blows per minute

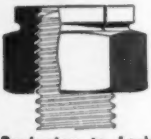
The manufacturer of this hammer reports, "FLEXLOC Self-Locking Nuts have solved our problem of obtaining a desirable fastener, because they withstand the terrific vibration induced by the impact of 3000 hammer blows per minute without working loose."

The FLEXLOCs were selected only after numerous fastening devices had been tested. Two ¼"-20 nuts hold the fastening bolts securely in position on the forward end of the hammer. One 1"-14 nut prevents loosening of the components at the nose.

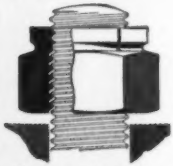
FLEXLOCs of various types and materials in a wide range of sizes are stocked by leading industrial distributors everywhere. See your FLEXLOC distributor or write for literature and samples. STANDARD PRESSED STEEL COMPANY, Jenkintown 52, Pennsylvania.



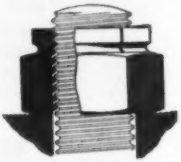
Starting. A FLEXLOC starts like any ordinary nut. Put it on with your fingers. Tighten it with a standard hand or speed wrench.



Beginning to Lock. As the bolt enters the segmented locking section, the section is expanded, and the nut starts to lock.



Fully Locked As a Stop Nut. When 1½ threads of a standard bolt are past the top of the nut, the FLEXLOC is fully locked. A FLEXLOC does not have to seat to lock.



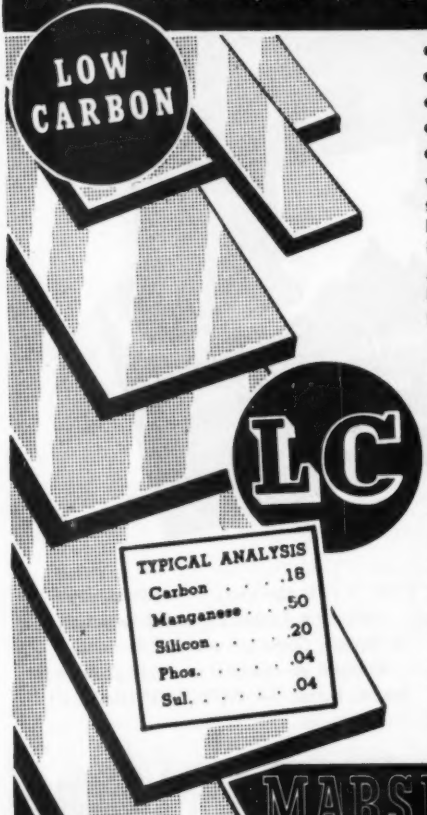
Fully Locked As a Seated Nut. When it is used as a lock or stop nut, the locking threads of the FLEXLOC press inward against the bolt, lifting the nut upward and causing the remaining threads to bear against the lower surface of the bolt threads. Vibration will not loosen a FLEXLOC, yet there is no galling of threads.

FLEXLOC LOCKNUT DIVISION **SPS** JENKINTOWN PENNSYLVANIA

ARISTOCRAT OF LOW CARBON GROUND FLAT STOCK

MARSHALL LC CRAT

Use it for Jigs, Fixtures, Patterns, Machine Parts or other pieces that require nothing more than case hardening.



- IT IS EASY TO MACHINE
- GRINDS TO A GOOD FINISH
- TAKES A GOOD CASE
- HAS EXCELLENT WELDABILITY
- OVER 190 Standard sizes in stock

We stock over a million pounds of steel. . .24 thicknesses up to 6 inches, 25" wide and 98" long. Modern Shear and flame cutting, including sketches.

Also a bar, strip and plate grinding service. New up-to-date facilities including most advanced grinding equipment. It will pay you to investigate.

Write for latest catalogs & prices

- **The world's largest range of sizes of precision ground tool steel available.**
- **WATERcrat:** A fine grained electric furnace high carbon tool steel. It has been wet ground to remove all bad surfaces and to assure velvet finish of virgin metal.
- **OILcrat:** An outstanding product of careful handling assures you of a fine grained electric furnace oil hardening ground flat stock ready for the layout bench.
- **AIRcrat:** This air-hardening tool steel shows less size change and offers a greater safety in hardening than either of the other grades.

Write for descriptive literature, catalog of sizes and prices.

MARSHALL STEEL CO.
McCOOK ILLINOIS

The Aristocrats of Ground Tool Steel

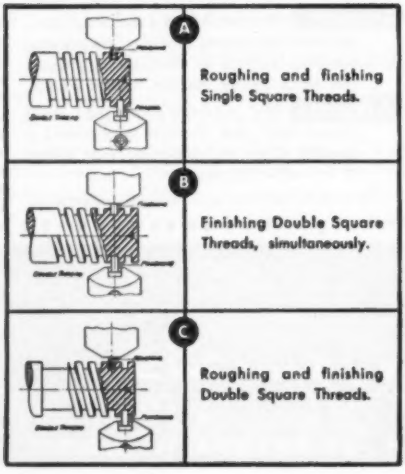
WATERcrat | OILcrat | AIRcrat | LC

P. O. BOX 108H LA GRANGE, ILLINOIS

How Do Coulter Automatic Threading Lathes SAVE TIME, MONEY, LABOR?

Because they are designed to permit over 25 alternatives for setting up the threading tool to meet specific applications.

For example:



THE "L1" is the most versatile of any threading Lathe, for the production of Square, Standard and 29° threads, internal or external . . . and it does it faster, better — AUTOMATICALLY!

Without obligation, consult our engineers with your specific threading problem. Catalog and machine specifications available upon request.

James Coulter Machine Co.
637 Railroad Ave. Bridgeport 5, Conn.

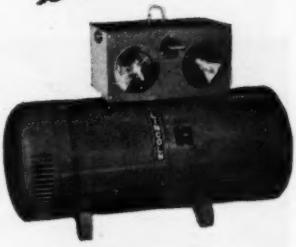
Machine Tool BUILDERS Since 1896

WELDERS ALWAYS ASK:

"But is it as good as a Lincoln 'Shield-Arc'?"

Here's why the Lincoln "Shield-Arc" welder is *the standard of comparison* for arc welders:

1. "Shield-Arc" delivers *any* type of direct current arc... not one or two types.
2. "Shield-Arc" delivers constant output of current, regardless of line voltage fluctuations.
3. "Shield-Arc" welders are constantly improved to weld faster ... at lower and lower costs.



LINCOLN "Shield-Arc" SAE
DC MOTOR-GENERATOR WELDER
200-300-400-600-900 amps.

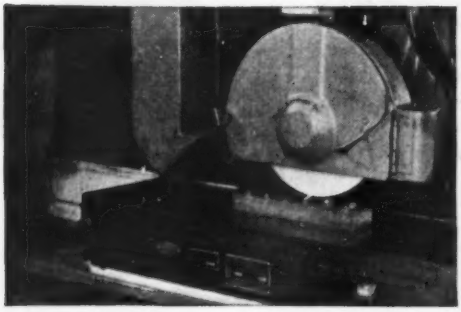
GET LATEST FACTS on cutting your welding costs. Send for Bulletin 459, available by writing on your letterhead to:

THE LINCOLN ELECTRIC COMPANY
DEPT. 3606 • CLEVELAND 17, OHIO
THE WORLD'S LARGEST MANUFACTURER OF ARC WELDING EQUIPMENT

COMPLETELY NEW

...A COMPLETE LINE!

V40 BOND TOOL ROOM WHEELS



A COMPLETE LINE OF WHEELS (Straight • Recessed • Straight Cup Flaring Cup • Dish • Saucer) FOR EVERY TOOL ROOM

...continually putting more sense in your ab[illegible]

COMPLETELY NEW!

FASTER CUTTING... and COOLER CUTTING

Even heavy infeeds can be taken without burning the stock or overheating the tool.

GREATER FORM HOLDING ABILITY... yet EASIER, FASTER DRESSING

when required, because of the special new vitrified bond composition.

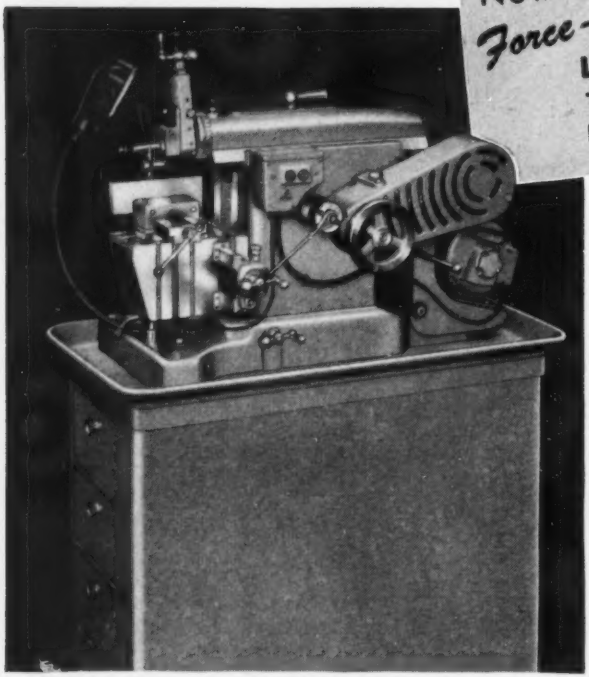
EASY TO ORDER! Grit for grit, grade for grade, these new wheels match your present specifications. *But*—see how the V40 Bond Wheel outperforms any other tool room wheel you are now using.

TRY ONE NOW! Call your CARBORUNDUM Distributor or Salesman (listed in the yellow pages of your phone book under "Abrasives" or "Grinding Wheels") for full details on these outstanding wheels. One trial will convince you! Write to The Carborundum Company, Dept. BB 81-412, Niagara Falls, New York.

CARBORUNDUM

REGISTERED TRADE MARK

81-412



New! *Force-Feed* LUBRICATION TO ALL IMPORTANT BEARING SURFACES

SOUTH BEND 7" Shaper

THE ONLY BENCH SHAPER WITH CIRCULATING FORCE-FEED LUBRICATION TO IMPORTANT BEARING SURFACES

SPECIFICATIONS

Ram

Stroke length—0 to 7". Strokes per minute (4)—42 to 195.

Tool Head

Travel—3". Swivels—360°

Table

9½" horizontal travel, 5" vertical. Power cross-feeds (6)—.002" to .012". Clears ram—½" to 5½".

You will be surprised at the variety of jobs this well-built 7" precision bench shaper will do. With it you can machine keyseats in shafts, pulleys, or gears; finish flat surfaces; square ends of shafts; machine slots, dovetails and grooves. Price $551 f.o.b. factory, less motor and stand.

Compared with our costs
OUR PRICES ARE LOWER
than they were back in 1941

Prices are closely tied to costs. Costs are still rising. Buy now before increased costs necessitate higher prices.

SEND INFORMATION CHECKED:

☐ 9" and 10" BENCH LATHES ☐ 10" to 16-24" FLOOR LATHES ☐ DRILL PRESSES ☐ TOOL GRINDERS ☐ ½" & 1" Collet TURRET LATHES ☐ 7" BENCH SHAPERS

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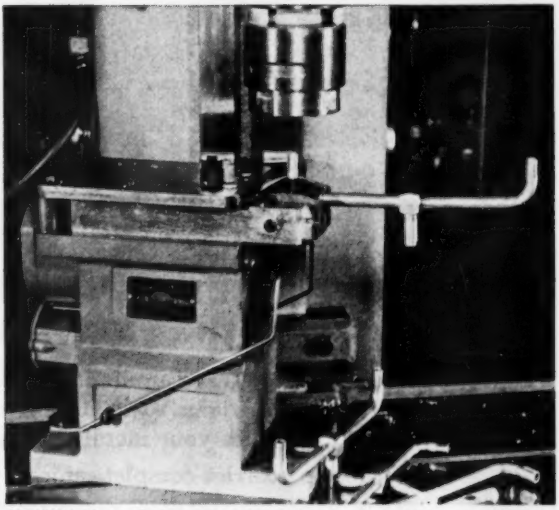
Building Better Tools Since 1906 • **SOUTH BEND LATHE** • South Bend 22, Indiana

Quicker changeover, lower tooling costs...

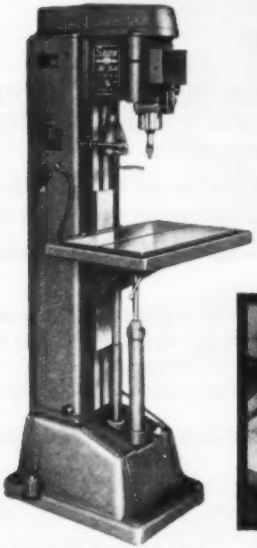
with SNOW FULL UNIVERSAL MACHINES

Basic Master Fixtures for DRILLING, THREADING or TAPPING. Snow universal machines are the most flexible, most efficient, and most economical known. They save countless dollars in changeover time — help you start jobs sooner — assure quality at high production rates.

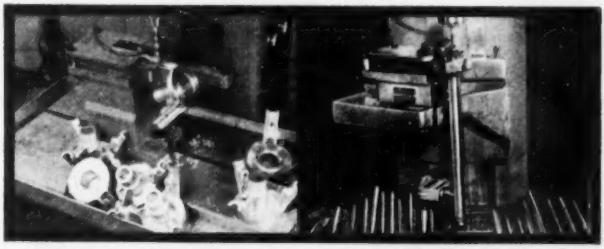
The square footage under a Snow Machine in your factory can be the most profitable in your whole plant. Submit details of your requirements.



AIR VISE holds part firmly — self-centering — always in exact position for precision work. U-shaped wire underneath provides quick finger-tip control, automatically starting spindle cycle. Jaw inserts keep tooling costs at minimum. Blank jaws always in stock — can be tooled to fit your part promptly, inexpensively.



ELECTRICALLY OPERATED AIR CONTROLLED AUTOMATIC OR SEMI-AUTOMATIC



Irregularly shaped parts are easily handled. Front feed permits close setting of guide plate for greater accuracy with high production

Here a short **AIR VISE** mounted on an offset table holds long tubing. Piece-part switch under table automatically closes vise and starts tapping operation.

SNOW MANUFACTURING CO., BELLWOOD, ILL.

(Suburb of Chicago)

saw any metal fast and efficiently

with VICTOR Hand or Power Hack Saw Blades or Band Saw Blades

LET YOUR VICTOR DISTRIBUTOR HELP YOU PICK THE RIGHT ONE

VICTOR

Because he's backed up and trained by experienced factory representatives, your VICTOR Distributor is ideally qualified to help you with your metal cutting operations.

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With his guidance, you can pick the *right* VICTOR Blade for the job you have to do...

VICTOR "MOLY"® High Speed Steel—tops for economy and performance.
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VICTOR High Speed Steel—The power blade that's unexcelled for durability and fast cutting.
VICTOR Unbreakable High Speed Steel—Absolutely shatter-proof, fast cutting, flexible, long lasting.

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SAW WORKS, INC. • MIDDLETOWN, N. Y., U. S. A.

Makers of Hand and Power Hack Saw Blades, Frames and Metal and Wood Cutting Band Saw Blades.

Glenzer Utility Tools

35 YEARS of *Specialized Service* to American Industry

Utility Sleeves

Removable Taper Shanks allow use of lower cost straight shank small tools. Ask for Data folder I-A.

Precision Friction-less Live Centers

Cushioned to reduce tool breakage—Timken Roller Bearings for accuracy, long life. Ask for Data folder I-D.

Floating Tool Holders

"GLENCO" Tool Holders compensate for misalignment up to 1/32" radius. Save set-up time—assure perfect work from worn machines. Ask for Data folder I-J.

THE J. C. GLENZER CO. Inc.

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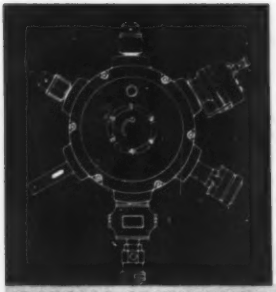

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AUTOMATIC • HYDRAULIC TURRET DRILLS

INCREASE PRODUCTION • IMPROVED QUALITY AT LOWER COST

...designed for

short, intermediate or long runs

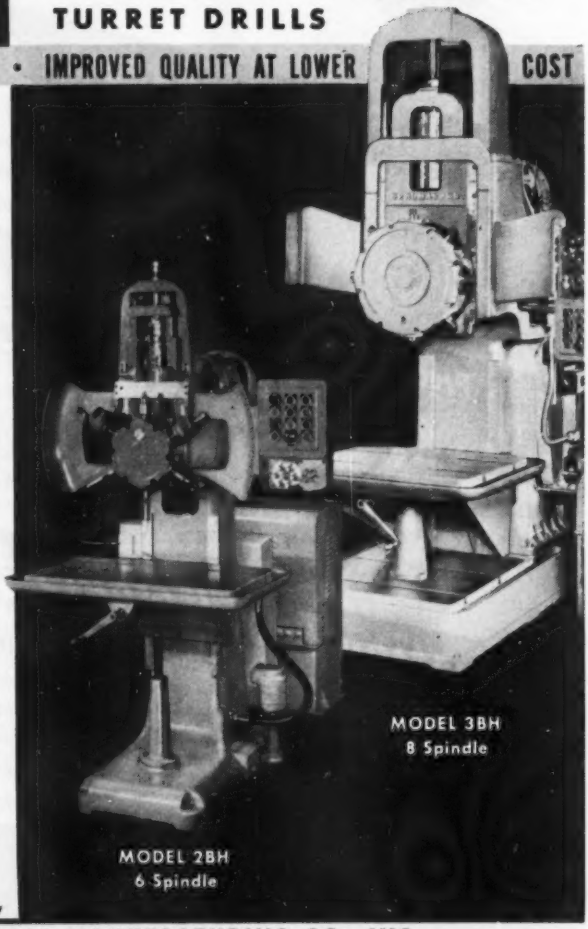
...featuring

infinitely variable pre-selective feeds

pre-selective spindle speeds
precision depth control
skip indexing
simple controls
easy set-up
low maintenance cost
saves floor space

one man can operate one or more máchines

write now for further information



MODEL 3BH
8 Spindle

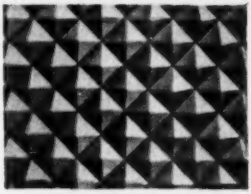
MODEL 2BH
6 Spindle

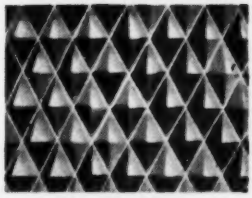
Manufactured by

BURG TOOL MANUFACTURING CO., INC. DEPT. MT4

P.O. Box 48, Gardena Sta., Gardena, Calif.

ALINA KNURL CUTTERS





ALINA KNURL CUTTERS actually mill the pattern and produce chips in the process. Alina Knurl Cutters will cut your machining time approx. 30%. They will provide the solution to some of your most complex knurling problems.

DESIGNED TO

- knurl all machineable materials
- knurl thin-walled parts without internal support
- maintain fine diametral limits
- knurl diameters from 1/16" to 10 ft.

Models available for all types of machines.
For detailed information and prices, write to

ALINA CORPORATION • 401 Broadway, New York 13, N. Y.

THIS walker-Turner COMBINATION *cuts costs!*

Add as many spindles as you want—and multiply your savings—with this combination designed for economical production drilling. You will note, as indicated by the drawing and photos, that you may combine *any number of Table Sections* to accommodate just the right number of 20" LIGHT-HEAVYWEIGHT Drill Press Spindles to fit the specific jobs you have to do.

This LIGHT-HEAVYWEIGHT combination gives you the maximum in flexibility and economy. The number of intermediate Table Sections determines the number of Spindles which can be varied to fit the nature of your work and output requirements. Best of all, you avoid the heavy expenditure for costly, specialized equipment.

Ask your Distributor to demonstrate the performance advantages of Walker-Turner LIGHT-HEAVYWEIGHT 20" Drill Press units. He has them in stock as Bench Models and Floor Models, and can specify Multi-spindle Models with exactly the number of drill heads you need.

Walker-Turner **LIGHT-HEAVYWEIGHT**
20" Multi-spindle Drill Press
(Six Table Sections—12 Drilling Units)

WALKER-TURNER

• DIVISION •
KEARNEY AND TRECKER CORPORATION
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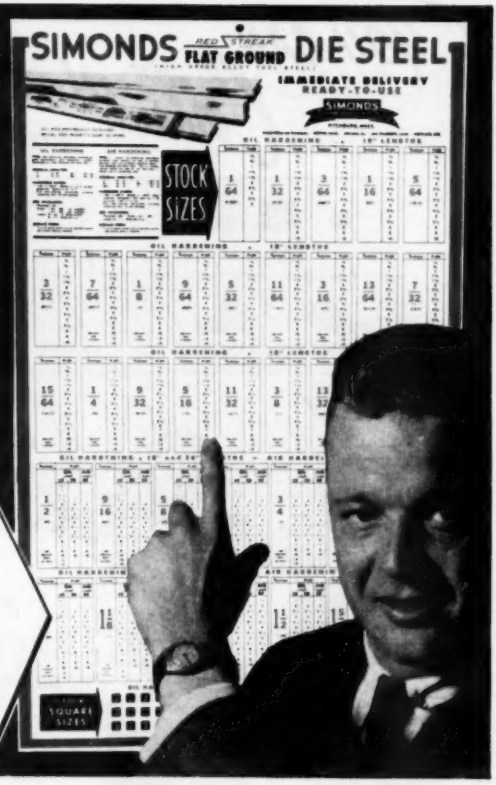
MT-11

Look at all the NEW STOCK SIZES of Flat Ground Die Steel

FREE WALL CHART!

Ask your SIMONDS DISTRIBUTOR for a copy of this New Chart (18" x 31") giving full range of Stock Sizes now available



WIDEST SELECTION OF STOCK SIZES EVER OFFERED!

Now you can get HUNDREDS OF NEW STOCK SIZES of Simonds high-grade, precision-ground tool and die steel . . . sizes that save you more time and money . . . sizes that formerly were special but now are available from stock at regular prices. Now you can get "1001 sizes for 1001 uses" . . . with your choice of OIL or AIR Hardening type steel in 18" and 36" lengths.

OIL HARDENING TYPE — Non-deforming, spheroidize-annealed for best machinability and consistently uniform hardenability — from Simonds' own steel mill. Extra-smooth finish with all decarburization and surface defects removed. Wide hardening range. Individually packaged (18" and 36" lengths) with simplified heat treating instructions.

AIR HARDENING TYPE — Non-deforming, spheroidize-annealed, 5% chrome — more wear-resistant yet easy to machine and heat treat with uniformly excellent results — another product of Simonds steel mill. Decarburization and surface defects removed. Wide hardening range. Individually packaged with heat treating instructions.

Get full information . . . NEW WALL CHART . . . and Immediate Delivery . . . from YOUR SIMONDS DISTRIBUTOR

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FLAT GROUND DIE STEEL

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YOU CAN *Cut in Seconds* with a fine finish

BARS	PIPE - TUBING	STRUCTURALS
EXTRUSIONS	SHEET & PLATE	MITERS

STONE *High-Speed* Cutting Machinery

LOOK AT THESE TYPICAL CUTTING TIMES!

COLD ROLLED STEEL— Bar Stock—1" x 1½"	6 sec.
HIGH SPEED STEEL— Bar Stock—1" x 1"	4 sec.
PIPE—Heavy Steel 2⅛" O.D. ¼" wall	10 sec.
TUBING—Stainless Steel 1¼" O.D. 1/16" wall	2 sec.
STRUCTURAL—Angle Iron 2" x 2" x ¼"	5 sec.
ALUMINUM—Bar Stock—1" x 1½"	3 sec.
BRASS—Pipe—1½"	2 sec.
COPPER—Bar Stock—1" x 1¼"	5 sec.

Powerful and ruggedly built, flexible and easily operated, Stone High Speed Cut-off machines are ready to give YOU all the advantages of fast, clean, low-cost abrasive cutting with a minimum investment in equipment.

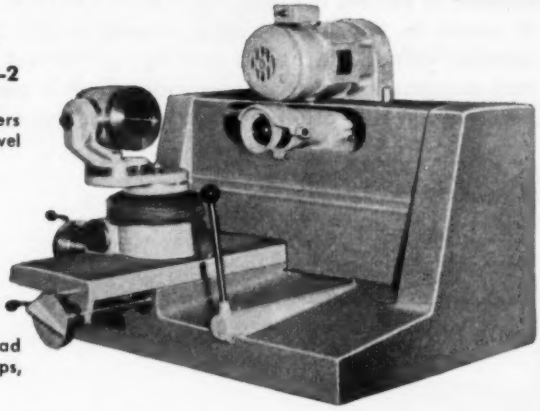
Write TODAY for Complete Information and prices.

STONE MACHINERY CO., INC.

404 FAYETTE ST. MANLIUS, NEW YORK

A FULL CAPACITY TOOL & CUTTER GRINDER AT ⅔ to ½ THE COST OF A UNIVERSAL MACHINE

STERLING Model RK-2
22" Cutters on workhead
11" Cutters between centers
12" Grinding Wheel Travel



NEW DESIGN
Moving grinding wheel instead of work makes easier set-ups, easier operation.

Where you need added tool and cutter grinding capacity, or a strictly tool and cutter grinder the STERLING RK-2 will give you complete versatility plus extra capacity at a big saving.

Reversing the usual procedure of passing the work across the wheel eliminates the large table and produces a compact machine. Set-ups are easier because everything is in the open. Operation is easier because less weight is moved and better control is possible.

Greater capacity (up to 22" cutters on the workhead, 11" cutters between centers) and 12" wheel travel make the STERLING RK-2 a grinder that will handle a big variety of tools and cutters.

Ask your dealer or mail coupon TODAY for complete information.

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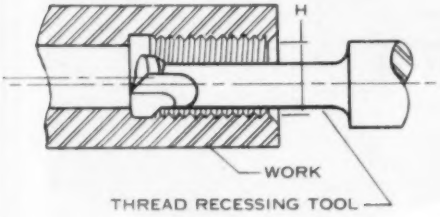
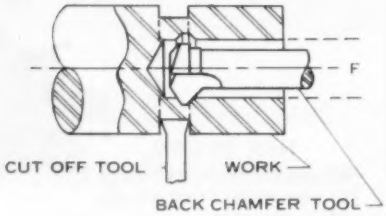
McDONOUGH MFG. CO.
1520 Galloway, Eau Claire, Wisc.
Please send us complete details on the NEW STERLING Model RK-2 Tool & Cutter Grinder.

Name_____
Address_____
City_____ State_____

Now FINISHED RECESSING TOOLS FROM STOCK

Instead of having the required tool made on a custom-made basis, it comes to you as one of a standard line production, thereby satisfies immediate needs and brings added economies to your tool purchases and tool operations. Both types of recessing tools available in H.S. Steel and Carbide-tipped.





THREAD-RECESSING TOOLS

To obtain perfect threads in blind holes, you can now purchase from stock, Standard Bokum Thread-recessing tools for most thread sizes.

These tools allow run-over with your threading tool or tap, insuring perfect threads to the full depth of hole and produce perfect fit for threaded stud.

BACK-CHAMFERING TOOLS

It is always desirable to back-chamfer a finished bore before cutting-off tool goes into action, to assure a cleaner, easier cut-off without throwing up burr.

The shank diameters and lengths of these new tools conform to standard sizes of screw machine tool holders.

The tools are radial and helical backed-off, with built-in clearances following the same design that typifies all Bokum tools. Buy them in assortments of 12 put up in convenient wooden boxes.

For thread-recessing send for Cat. Sheet H-T-R; for back-chamfering, Cat. Sheet, H-B-CH

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Reduce Broaching Costs
ON SMALL JOBS

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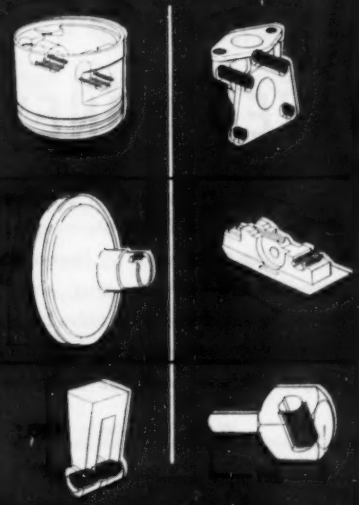

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ORIGINATORS OF ROTARY SHAVING AND ELLIPTOID TOOTH FORM

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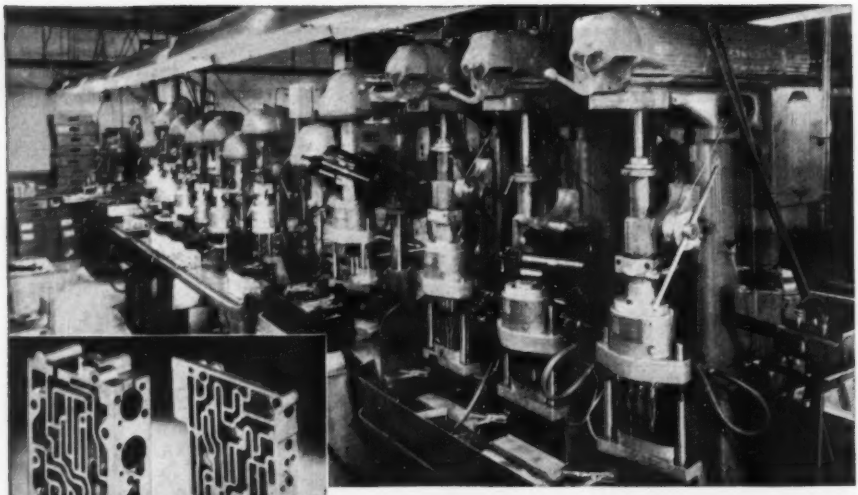
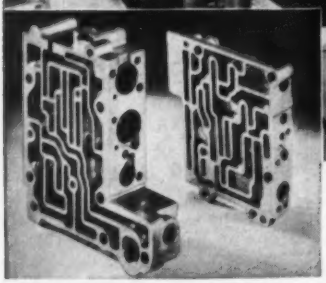
WORLD'S LARGEST PRODUCER OF GEAR SHAVING EQUIPMENT





51 holes in cover and valve body vary in diameter from 1/16" to 13/16".

HERE'S HOW ZAGAR TOOLING SAVED MONEY HAND OVER FIST

This aluminum die casting is processed in its entirety by Zagar planning, except for milling two faces. Two lines of Zagar standardized self-clamping drill jigs ream, tap and drill both valve body and cover. With 24 heads and 24 fixtures, Zagar performs work on 51 holes on close centers. Step tools take care of reaming and burnishing. The fixtures were designed to compensate for slight inaccuracies in the die casting. Thus has Zagar engineering solved an acute problem of limited production without the purchase of costly special machines.

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TOOLS FOR INDUSTRY and SPECIAL MACHINERY

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Only authorized personnel carry a key for the Cross Flow Control Lock! They set machine feed rate, then lock it.

Easy to install. Just remove valve nameplate and adjusting lever, re-install over lock mounting plate.

Available for Vickers 1/4" flow control valves and remote control panels.

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- **Eliminates Tampering**
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- **Prevents Tool Abuse and Breakage**
- **Protects Machines Against Overloads**
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Established 1898

THE CROSS CO.

DETROIT 7, MICHIGAN

You can also

"ROLL YOUR OWN"

TO SAVE MONEY ON SHAPES*

BEAMS against web

ANGLES both legs in

ANGLES leg in

ANGLES leg out

TEES on flange

BARS on flat —on edge

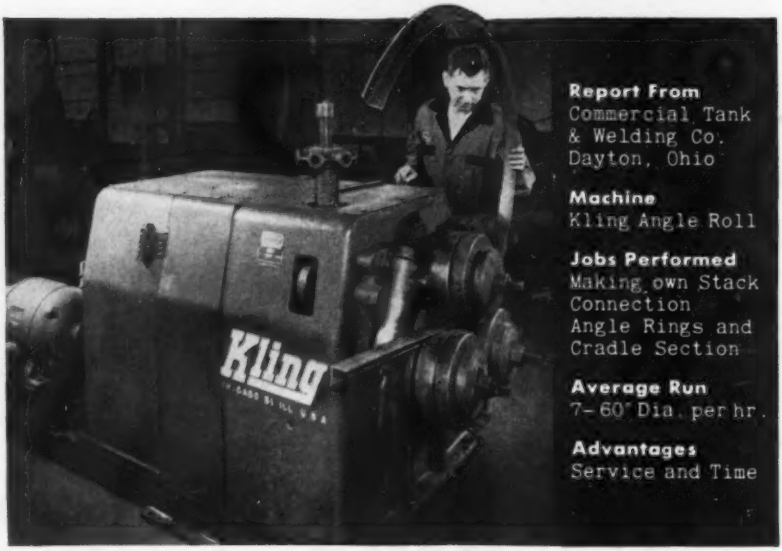
ROUND BARS spiral

RACK teeth out

CHANNELS against web

CHANNELS leg in—leg out

RAILS ball out



Report From
Commercial Tank & Welding Co. Dayton, Ohio

Machine
Kling Angle Roll

Jobs Performed
Making own Stack Connection Angle Rings and Cradle Section

Average Run
7–60" Dia. per hr.

Advantages
Service and Time

**At the side are shown some of the various Shapes you can roll with Kling Angle Bending Rolls*

Kling ANGLE BENDING ROLLS

are used in the **"BEST OF COMPANIES!"*** *—to cut production costs*

Are you paying big prices for formed structural shapes and curved reinforcements like those illustrated? Then investigate the savings you can make by "rolling your own" on Kling Angle Bending Rolls. With these rolls you can also make your own gear blanks, motor housings, wheels, and many other machinery parts.

Kling Angle Bending Rolls are extra heavy construction; hand or power adjustment; designed to handle both angle and flat bars and can be equipped to handle forming of pipe, beams, channels, etc. Recent expansion makes Kling one of the leading producers of rolls of all types, including angle bending and plate bending (pyramid or initial pinch type) rolls.

**Following are some of the companies using Kling Machines:*

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For detailed description of Kling Angle Rolls send for Bulletin 600.

KLING BROS. ENGINEERING WORKS • 1320 North Kostner Avenue, Chicago 51, Illinois

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save 80% of boring time

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DEKA-BORE (and only DEKA-BORE) can be adjusted in fractions of 1/10,000" on the full diameter as easily as reading 1/16" on a steel rule. NOT A VERNIER OR SCROLL ADJUSTMENT. Can be calibrated in increments of .00005 on radii or .0001 on diameter as easily as picking up .002 on a conventional micrometer dial.

100% GUARANTEED!

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The best "soft" hammer your money can buy!

Tough, resilient water buffalo faces deliver plenty of power with full protection for delicate parts and finishes. Faces are easily replaced, and comfortable Safety-Flare handle gives you non-slip grip. Work goes better with a C/R RAWHIDE Jaw-Head. See for yourself.

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- ***Available from leading industrial suppliers. Also C/R Rawhide mallets and Rawhide mauls. For further information write Dept. 22***

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HYPREZ DIAMOND COMPOUNDS

For all finishing jobs—from rough to mirror polish.

HYPREZ, the original Diamond Compound, is available in types and grades for every finishing requirement; in 18- and 5-gram sealed cartridges for use with the Hyprez Applicator Gun.

Hyprez Diamond Compounds—a true invention, unique in composition . . .

- Are used in 19 foreign countries, in addition to the United States and Canada.
- Are patented in Switzerland, Sweden, Great Britain, and France.
- Are manufactured under exclusive license in Great Britain, Switzerland, and France.

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SAFE, UNBREAKABLE

high speed blades

from your STAR Distributor?

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STAR SERVICE COSTS NO MORE

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Makers of Hand and Power Hack Saw Blades, Frames, Metal Cutting Band Saws and Clemson Hand and Power Lawn Machines.

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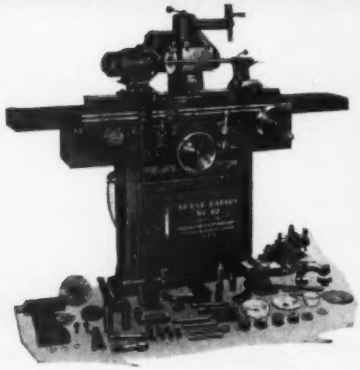
UNIVERSAL CUTTER AND TOOL GRINDERS



are on improved delivery schedules

It's true, they have been hard to get because every model offers extra value.

The Model 62, for instance, features four-speed spindle drive, universal positioning of elevating hand wheel, anti-friction ways, more vertical capacity, longer swing, one-shot lubrication system.

The many other Grand Rapids Cutter Grinders are also on improved delivery schedules. Send coupon for complete information.

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Please send me the following literature.
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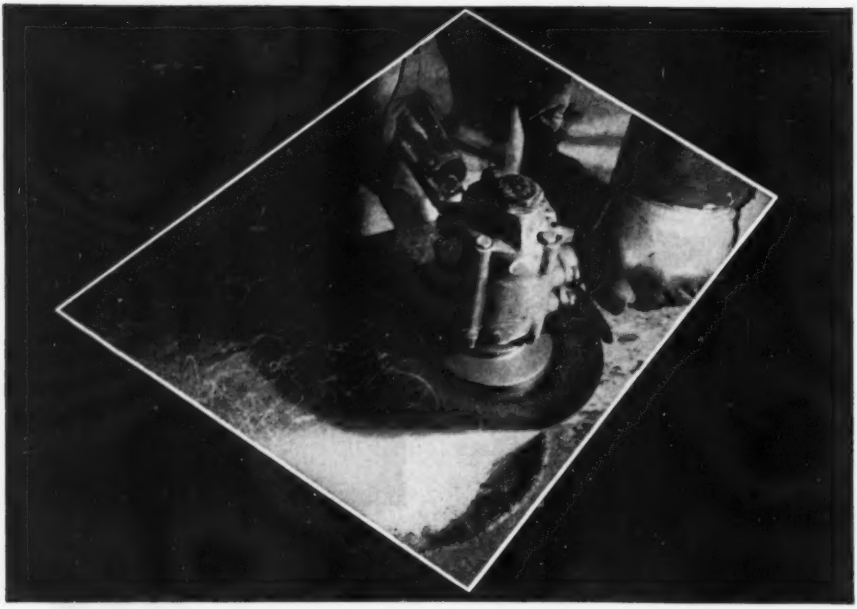
We'll answer within twenty-four hours



Manhattan Moldisc—More use per dollar

A FRESH CUTTING FACE . . . throughout the life of the wheel means that Manhattan Moldiscs last longer . . . retain full metal removal efficiency right down to the last usable part of the wheel. The secret — Manhattan's special molded, resinoid bonded abrasive which presents a fresh cutting surface throughout the wheel thickness, and which does not load or glaze. Actual plant tests show that Moldiscs effect important savings in faster grinding time and fewer time-outs for disc changes. For MORE USE PER DOLLAR and better quality work specify Manhattan Moldiscs. Bonded in various resiliencies from fast roughing to fine finishing. Standard size 7" x ¼" x ⅞". For speeds to 6,000 RPM. Mounting flange and nut furnished on request.

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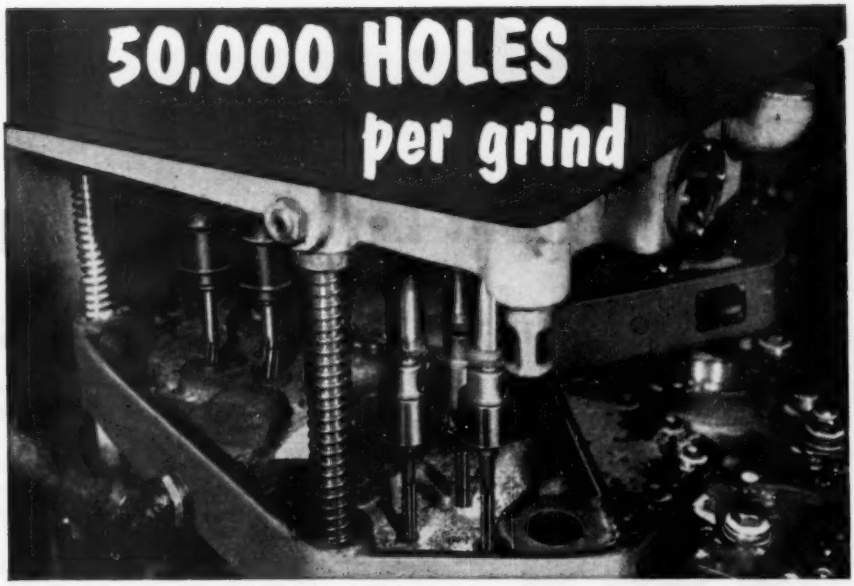
RAYBESTOS-MANHATTAN, INC.

Manufacturers of Mechanical Rubber Products • Rubber Covered Equipment • Radiator Hose
Fan Belts • Brake Linings & Blocks • Clutch Facings • Packings • Asbestos Textiles • Teflon
Products • Powdered Metal Products • Abrasive & Diamond Wheels • Bowling Balls

MR 943-R

50,000 HOLES per grind



Many manufacturers are discovering that Whitman & Barnes carbide reamers reduce machine down-time and costs by providing more holes per grind. Typical is the above illustrated reaming of ½" diameter holes in the cast iron planet carrier assembly at a well known automobile plant.

Six flute W & B carbide reamers were selected by this Michigan manufacturer to secure on this tough operation a maximum number of reamed holes per grind. These W & B carbide reamers are consistently reaming 50,000 or more holes before regrinding is required. This high performance is characteristic of the quality designed and manufactured into every W & B carbide reamer.

In addition to complete lines of carbide drills and reamers, Whitman & Barnes manufactures many other carbide cutting tools, also drills and reamers of high speed steel. For finest quality, long-life and a reduction in your cutting costs—select W & B tools.

W&B

YOUR INDUSTRIAL DISTRIBUTOR
Can Give You Quick Service
On Whitman & Barnes Tools.
Contact Him Today!

WHITMAN & BARNES

40045 PLYMOUTH ROAD • PLYMOUTH, MICH.

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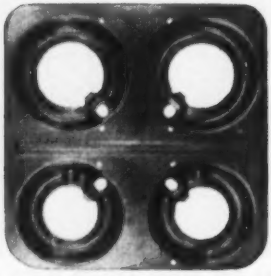
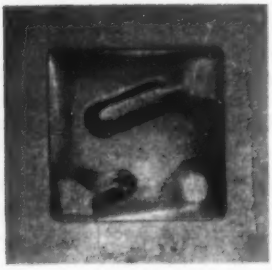
Plastic Low Cost Tooling

For

Dies · · · Drill, Welding, and Assembly Jigs





Vulcan, keeping pace with modern tooling, can recommend plastic tooling for medium production on numerous tool programs.

Plastic tools are light in weight, have good impact, compressive strength and dimensional stability. No hand finishing of parts required as galling or marking is eliminated by using plastic form dies.

Contours and odd shapes are cast or laminated to suit individual tools, saving expensive machine and hand finishing operations.

Plastic tools, built in a matter of days instead of weeks, lower your tool costs for those medium production runs.

Our actual production figures prove plastic has a definite place in modern production.

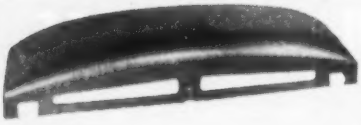
Vulcan Tool Company's organization, building fine tools since 1916, believes new tooling developments must be proved by tool engineers. Since plastic is not a cure-all your problem should be handled by recognized, practical tool men.

Our engineering staff will recommend the correct plastic material and advise if parts of your tooling program should be in plastic.

Send a part print and your production requirements for quotation and recommendations.

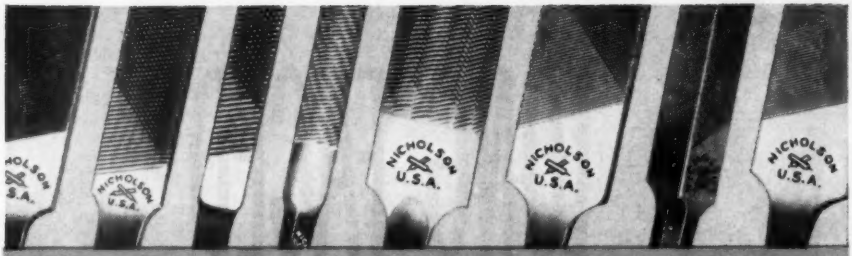
VULCAN TOOL CO.... PLASTIC TOOL DIVISION

Highland Avenue, Dayton 10, Ohio

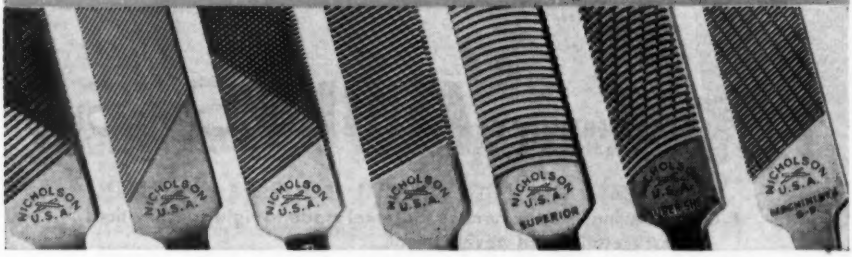


Major Vulcan Services

Engineering, Processing, Designing and Building Special Tools . . . Dies . . . Special Machines . . . including the Vulcan Hydraulics that Form, Pierce, Assemble and Size, Vulcanaire Jig Grinders, Plastic Tooling.



Wide acceptance proves their merit



Purchasing and production heads like to do business with distributor representatives who have "what it takes." That, first of all, is GOOD PRODUCTS with WIDE ACCEPTANCE.

There is no better example than Nicholson or Black Diamond files. Through four generations of steadfast quality manufacture, Nicholson has gained world-wide recognition of these outstanding brands.

The variety of file types, cuts and sizes is designed for meeting the growing file requirements of modern production methods, shop practices and metals. Nicholson and Black Diamond files are meticulously made to remove the most metal in the shortest time. They provide the means to save workmen's time and bring filing costs down to an irreducible minimum.

With an all-time-high user acceptance supporting Nicholson and Black Diamond, why not put all your filing needs under the smooth guidance of your Nicholson industrial distributor?

NICHOLSON FILE CO., 16 Acorn St., Providence 1, R. I.

(In Canada: Nicholson File Company of Canada Ltd., Port Hope, Ontario)

NICHOLSON FILES FOR EVERY PURPOSE

LONG FACED

OVER YOUR TOOL STEEL FLAT STOCK ?

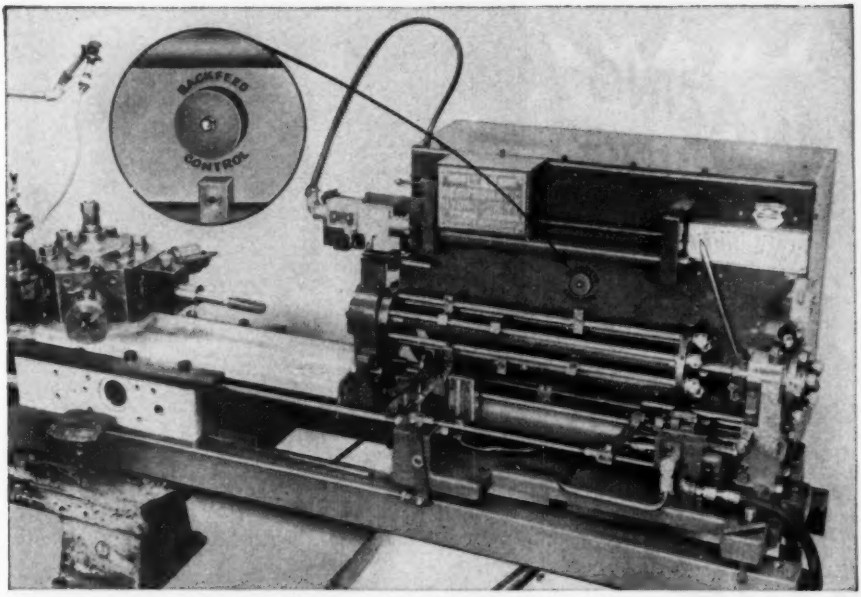
...THEN TRY ATKINS Silver Steel®

- Oil hardening, electric furnace tool steel made to rigid specifications —latest metallurgical development.
- Precision-ground on all four surfaces. Sides parallel and square, free of defects and decarburization.
- Hardens deeply with closely refined grain structure—unusually tough!
- Withstands many grinds—gives long production runs.
- Tendency to warp or change dimensions as result of heat treatment is negligible.
- Now available in all standard sizes.

Use for dies in operations such as: Blanking • Trimming • Punching • Forming • Piercing • Perforating • Embossing . . . any work that demands accuracy. Cutting and finishing non-ferrous metals—particularly brass and bronze.

Call Your Atkins Distributor

ATKINS SAW DIVISION
BORG-WARNER CORPORATION • Indianapolis 9, Ind.



TURRET BACKFEED on LYNN HYDRAULIC DRIVE puts cross-slide operations on the "HEX"

Now you can rough going in, finish coming out on the same hex station. The LYNN Hydraulic Drive with the new Turret Backfeed makes it possible to take many operations off the cross-slide and put them on the "hex".

The rate of feed on the backfeed is independently adjustable and can be used on any or all turret stations. Putting operations such as finish turning I.D., inside chamfering, cutting thread reliefs and "O" ring grooves on the turret speeds production and improves quality.

When you put a LYNN Hydraulic Drive on a Turret Lathe we GUARANTEE a 20% INCREASE IN PRODUCTION. With the new Turret backfeed still greater production is possible.

Write TODAY for complete information on the LYNN Hydraulic Drive equipped with Turret Backfeed.

Other Lynn products include: Conversion Turrets, Self Indexing Tool Posts, Slide Tools.

LYNCOLN INDUSTRIES
Minneapolis 4, Minn.

AMAZING SAVINGS IN METAL CUTTING ARE MADE BY

FRICTION SAWING

with Tannewitz HIGH SPEED BAND SAWS

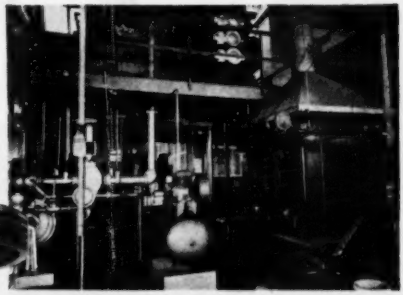
The ease and speed with which these machines cut through sheets of soft or hard steel, non-ferrous metals, plastics and many other materials provides marvelous opportunity for increasing production and lowering costs. And for cutting formed parts, or trimming castings, there's nothing to compare with it, for the down-drag of the saw is so negligible that in most cases no jig or rest whatsoever is required. Get the complete facts, NOW!

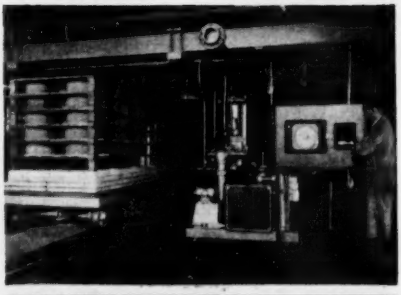
GET YOUR FREE COPY OF FRICTION SAWING

The TANNEWITZ WORKS

GRAND RAPIDS, MICHIGAN

From the NEW Blanchard Wheel Shop





VITRIFIED WHEELS

For more than 25 years, Blanchard has directed its efforts toward developing the best grinding wheels for Blanchard Surface Grinders. It began by pioneering with silicate bonded wheels, and then resin bonded wheels. Now, from a new, ultra modern Blanchard wheel shop come *vitrified wheels* ... scientifically batched, pressed and fired ... with positive control of time and temperature.

Today, Blanchard offers complete wheel service ... silicate, resin and vitrified!

Use Blanchard wheels on your Blanchard Surface Grinder. They do a better job in less time, with less trouble and cost ... whether your work is tough as copper or fragile as glass ... whether it requires heavy roughing cuts or clean-up cuts with flatness to .000005" and finish of 1 micro-inch.

for Better Blanchard Grinding

PUT IT ON THE BLANCHARD

THE BLANCHARD MACHINE CO.

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COUPON

Please send free copy of Blanchard Wheel Booklet and Wheel Holder Folder. BB

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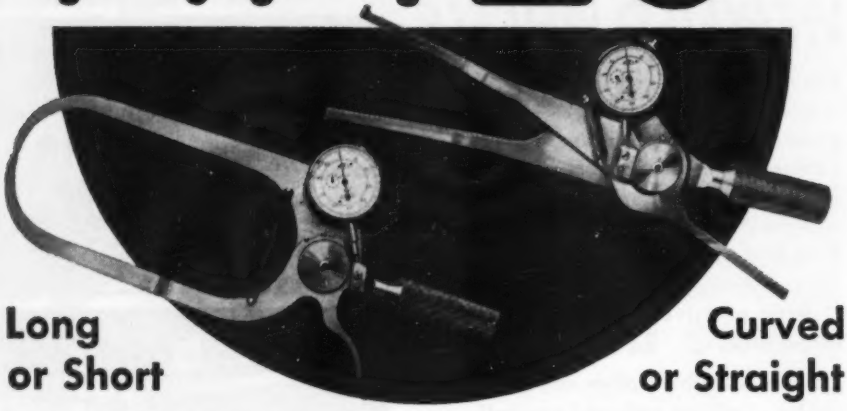
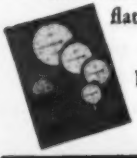


Long or Short

Curved or Straight

CALIPER GAUGES—Custom-built to fit your exact need.
Whether it's measuring the inside dimensions of a pipe, the wall thickness of a casting, the outside dimensions of a rocket—Ames can build the caliper gauge that fills your requirements.

Ames caliper gauges are made of carefully-finished heavy gauge steel and are equipped with an Ames exclusive: a chordal error correcting cam that assures accurate readings. Ames calipers are available with contacts of various shapes—ball, flat or pointed—made of carbide, hardened steel, or sapphire.



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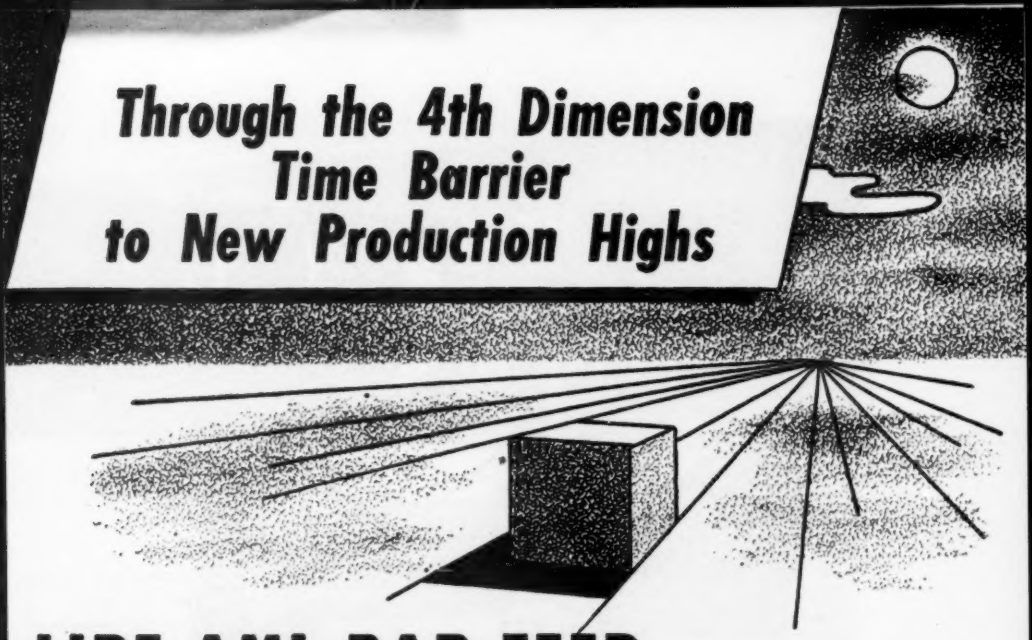
Your measuring problems may involve a caliper gauge. If so, send it to Ames—for a quick, profitable solution.

Representatives in principal cities.

B. C. AMES CO. *28 Ames Street Waltham 54, Mass.*

Mfgr. of Micrometer Dial Gauges • Micrometer Dial Indicators

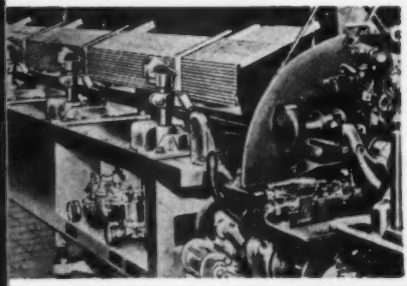
Through the 4th Dimension Time Barrier to New Production Highs



LIPE AML BAR FEED

gears machine production to the steady flow of Time

All industrial results are achieved in Time . . . *vital 4th dimension that measures output, costs, profit.* Shorten the time gap between operations . . . shorten the time when machines are "cutting air" . . . keep machines producing at a steady optimum rate during the fatigue slow-down from 10:30 to noon, and from 3 P.M., till closing time . . . *and you are getting 4th Dimension production.* Production that is geared to the steady flow of Time.



Lipe AML Bar Feed Produces from 30% to 100% More Output by Eliminating Time Losses . . . . .

Time losses account for the enormous differences in output among workmen. By eliminating these losses automatically, the Lipe AML Bar Feed boosts overall production from 30% to 100%. That's because stock is fed to the machine independent of the operator. Constant pressure behind the stock assures uniform speed of feed. No feed fingers to fail or mar stock. No multiple feed-outs, even on the longest pieces.

Mail the coupon now for free literature giving full details on the Lipe AML Bar Feed.

LIPE ROLLWAY

LIPE-ROLLWAY CORPORATION
Syracuse 4, N. Y.

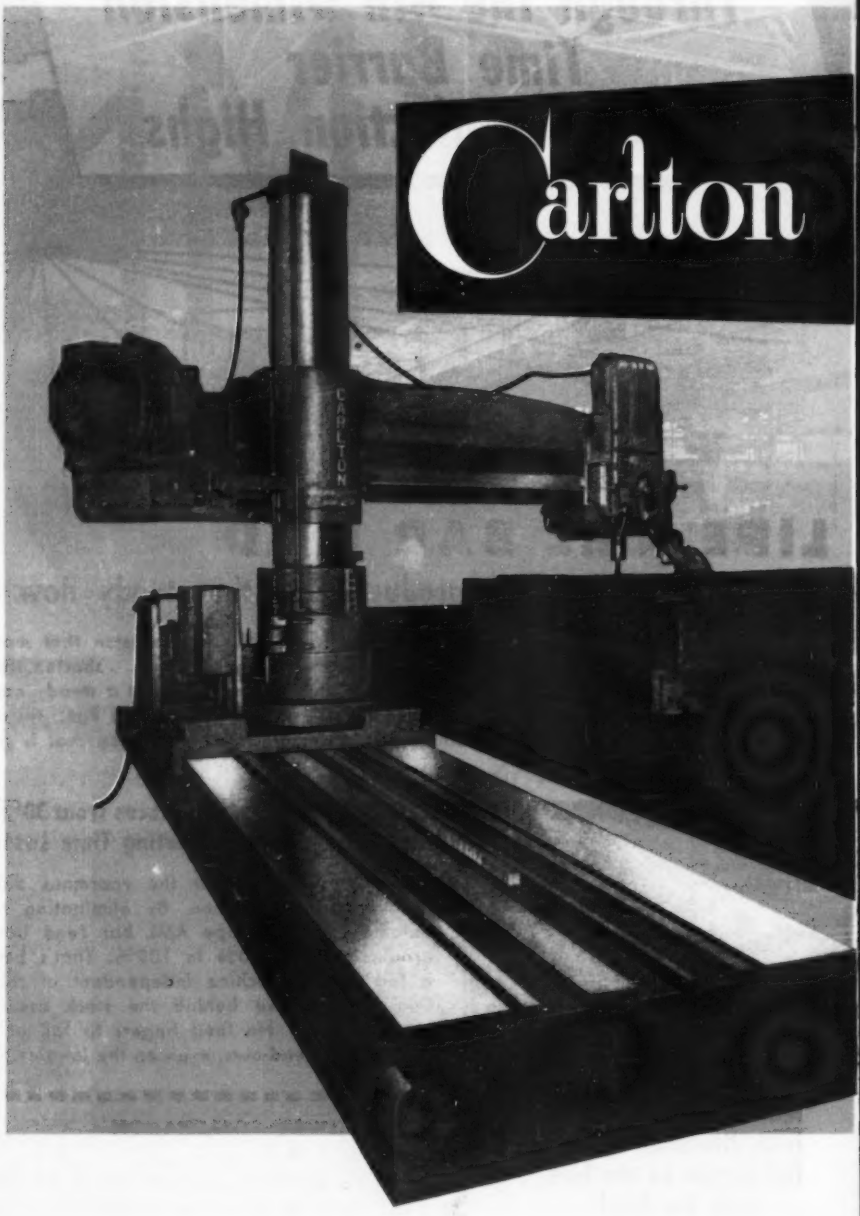
Sure, I'd like to know more about the Lipe AML Bar Feed. Send me your free booklet.

Name_____ Title_____

Company_____

Street_____

P.O._____ Zone_____ State_____


Carlton
CARLTON

puts you on the track to real hole drilling efficiency!

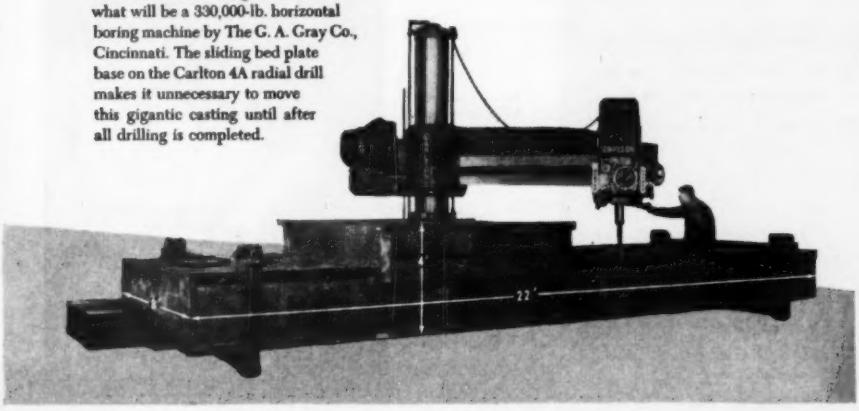
Carlton "gets around." Yes, thanks to its special sliding bed plate base, this Carlton 4A radial drill moves the entire length of this 22-ft long G. A. Gray Co. casting. At one setting it drills the required 75 levelling screw holes without the necessity of lifting so much as an ounce of its 33 tons.

Think what this special Carlton mounting saves in terms of time, energy and expense in drilling this one casting alone! And yet this is but one of many Carlton engineering achievements planned for you . . . to bring you maximum hole drilling efficiency.

Carlton offers seven other types of mountings, plus a variety of plain or uni-tilt tables and revolving jigs. And there's an equally wide choice in the Carlton radial drills themselves, too: many different models with arm lengths from 3-ft to 12-ft, column diameters from 9" to 26"

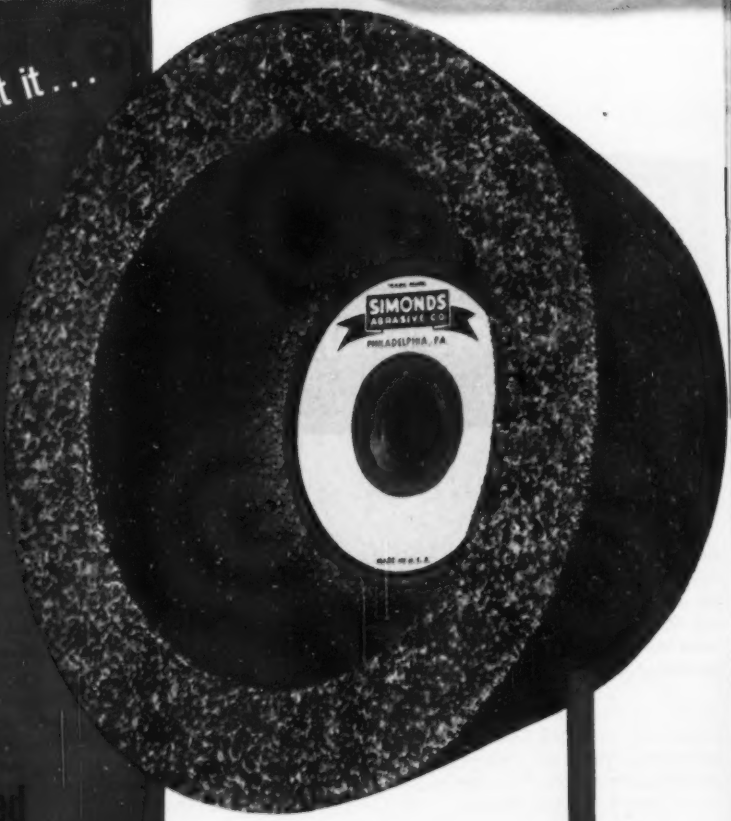
Carlton engineers will be glad to work with your engineers in laying out the most efficient radial drill set-up for your requirements. For maximum hole drilling precision and production today and tomorrow, check Carlton now. The Carlton Machine Tool Co., Cincinnati 25, Ohio.

Gray Builds 'em Big!
This 65,260-lb. casting is the bed of what will be a 330,000-lb. horizontal boring machine by The G. A. Gray Co., Cincinnati. The sliding bed plate base on the Carlton 4A radial drill makes it unnecessary to move this gigantic casting until after all drilling is completed.



any way you look at it...

portable grinding is profitable grinding with SIMONDS resinoid bonded grinding wheels



Rotor type cup wheel—cross section shows steel bushing flange and safety ring.

SIMONDS
ABRASIVE CO.
PHILADELPHIA 37, PA.

BRANCH WAREHOUSES: BOSTON, DETROIT, CHICAGO, PORTLAND, AND SAN FRANCISCO · REPRESENTATIVES IN PRINCIPAL CITIES
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INCREASES PRODUCTION...

LOWERS COSTS...

PAYS FOR ITSELF QUICKLY...

The ROUSE HAND MILLER is a widely used, inexpensive, high speed, ball bearing, motor driven machine for handling light cuts in brass, aluminum, steel, plastics, and other materials—fast, accurately, and at very low cost. Only $110.00 Fixtures (illustrated) extra.*

*Motor equipment:—1/4 H.P. 110 Volt AC 60 cycle, single phase, swivel motor mount and light—$36.00**

**All prices FOB Chicago.*

- ★ **MILLS SMALL PARTS MUCH FASTER.**
- ★ **DRASTICALLY CUTS YOUR INVESTMENT IN EQUIPMENT.** Replaces expensive production machinery—or releases it for other jobs.
- ★ **INEXPERIENCED HELP CAN OPERATE IT.** Safe, simple, fool-proof operation.
- ★ **NO MORE COSTLY SET-UP TIME. $110.00*** price so low that it pays to keep one or more Hand Millers always set-up for special operations.
- ★ **YOU GET A BETTER PRODUCT**—the result of ABSOLUTE ACCURACY.
- ★ **A LOSS BECOMES A PROFIT** when marginal pieces are finished on the Hand Miller instead of on high cost equipment.
- ★ **VERY LOW MAINTENANCE.**
- ★ **USED REGULARLY IN 1163 MANUFACTURING PLANTS** (some of which use as many as 30 machines)—yet on the market a scant few years.
- ★ **UNIQUE—VERSATILE.** Nothing else like it. One or several machines can be the answer to some of *your* production problems.

Write today for further information.

H. B. ROUSE & COMPANY

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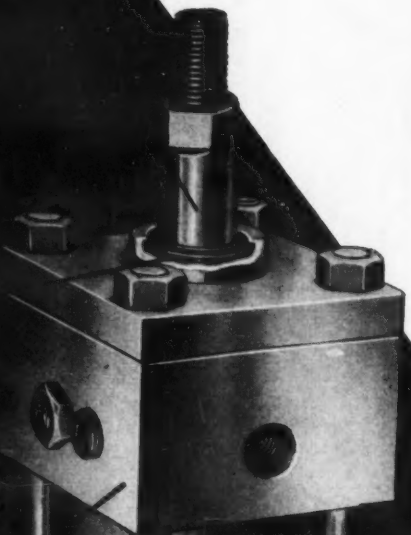
50 YEARS OF SERVICE TO INDUSTRY

Miller AIR CYLINDERS

HARD CHROME PLATED PISTON RODS
Prevent Scratch-Damage, Nicks and Rust

DIRT WIPER SEALS
Protect Rods, Seals, Bushings

SOLID STEEL HEADS, CAPS and MOUNTINGS
Eliminate Breakage



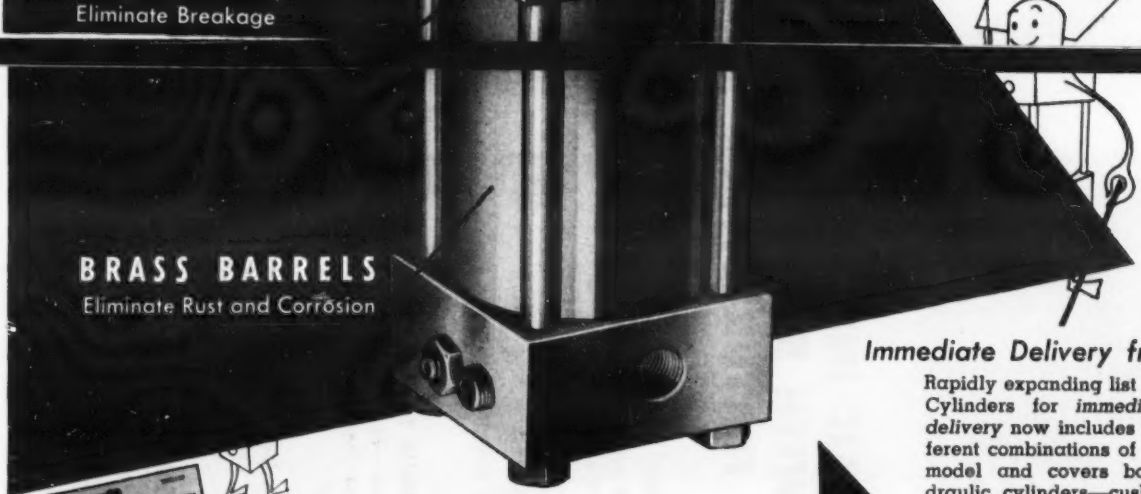
Complete "Custom-Built" Line

Miller "Custom-Built" Air Cylinders are available on normal scheduled delivery in *thousands* of combinations of bore, stroke and mounting style to meet every push, pull, lift, clamping or pressing need.

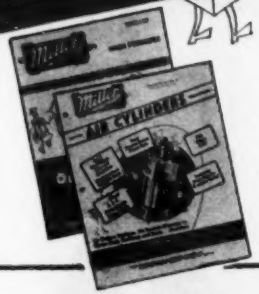
Bore range is 1½" to 20". Any desired stroke. 13 standard mountings. Single and double rod end, single and double acting, spring return, cushioned and non-cushioned, oversized-rod and water-fitted cylinders are included.

Miller Air Cylinders are renowned for longest life with near-zero maintenance in heavy duty service. They feature the SPACE-SAVING SQUARE DESIGN originated by Miller in 1945 and fully met the J. I. C. Pneumatic Standards years before their adoption in 1950.

Eliminate Breakage



BRASS BARRELS
Eliminate Rust and Corrosion



WRITE FOR CYLINDER BULLETINS A-105 and H-104

Complete Miller cylinder line includes: air cylinders, 1½" to 20" bores, 200 PSI operation; low pressure hydraulic cylinders, 1½" to 6" bores for 500 PSI operation, 8" to 14" bores for 250 PSI; high pressure hydraulic cylinders, 1½" to 12" bores, 2000-3000 PSI operation. All mounting styles available.

Immediate Delivery from "Stock"

Rapidly expanding list of Miller "Stock" Cylinders for *immediate*, off-the-shelf *delivery* now includes *thousands* of different combinations of bore, stroke and model and covers both air and hydraulic cylinders—cushioned and non-cushioned.

These are in addition to Miller "Custom-Built" Cylinders available on normal scheduled delivery in an almost infinite selection.

"Stock" Boosters also available for immediate delivery.

Write for Complete Catalog and Stock List!

SALES AND SERVICE FROM COAST TO COAST

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(Formerly MILLER MOTOR COMPANY)

Miller

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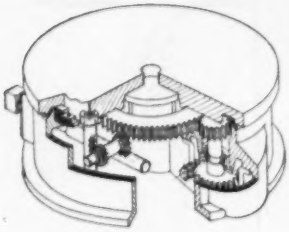
AIR & HYDRAULIC CYLINDERS • BOOSTERS • ACCUMULATORS
COUNTERBALANCE CYLINDERS

new HYDRAULIC INDEX TABLE WITH BUILT-IN SAFETY FEATURES



✔ **SIMPLE DESIGN**
Merely a worm and a worm gear.
Notice the cut-away drawing.

✔ **COMPLETELY HYDRAULIC OPERATED**
The Index Table is driven by a fluid drive motor to provide smooth operation.

✔ **PROVIDES YOU MAXIMUM SAFETY**
Electrical failures in any unit—engaging fixtures with drill head, while the table is in operation—stops the table automatically.

Now available in four sizes—20", 30", 42" and 60"
Can be bored for any number of stations (2 to 15)

Michigan DRILL HEAD CO. Detroit 34, Michigan
engineers and manufacturers of production machines and drilling equipment

DRILL-SPOT FACE-COUNTERSINK-REAM-TAP

20

individual operations

...on one Part
...on one Machine
...in ten Seconds!

...that's precision production on a Morris

MOR-SPEED Machine

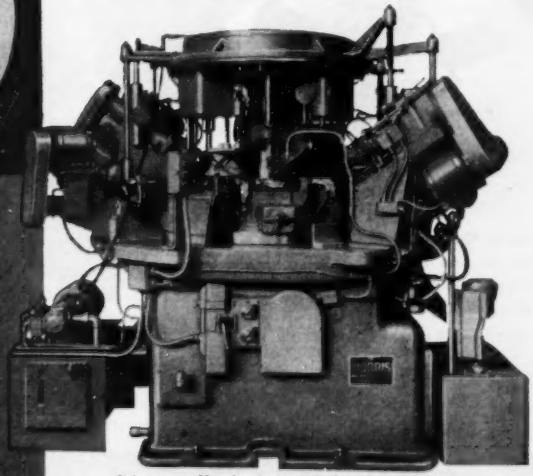
a better product at less cost with precision PLUS production

It's easy to say "the way to higher production and lower costs lies in special machinery." The sky-high price and limited application of a "special" often makes this solution impractical.

But Morris Engineers have developed a time-tested method for delivering precision production at lowest cost . . *without* a staggering investment. Morris MOR-SPEED Machines combine *standard* machine units in a special design that offers all the advantages of "special machinery" without the big price tag.

The machine illustrated is a good example: standard base, standard indexing table, standard center column, standard straight and angular drilling heads, standard coolant and hydraulic units plus a minimum of special tooling. The result is "special" machine production at a very special, low cost. Your drilling, tapping, reaming and similar operations may be adaptable to a MOR-SPEED solution. It costs you nothing to find out!

Write today for complete details.



Ask your Morris representative for details on our deferred payment plan.

THE MORRIS MACHINE TOOL CO.

937 Harriet St., Cincinnati 3, Ohio

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VERSATILITY CUTS
OPERATIONAL COSTS
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DRILL SLEEVE
FOR #4 MORSE
TAPER DRILL
No matter what your tool requirements may be – no matter how often tools must be changed–Beaver Quick-Change Tool Holders and Adaptors will save you money.
Less than ten seconds per tool change and no loss of accuracy gives you maximum production from each machine.
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⅜" END MILL
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END MILL
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BORING BAR
Beaver Quick-Change
Tooling can be installed
on most standard machines.
Let us show you how it will
benefit YOUR machine operations.
Write for our complete catalog #52.
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ADAPTOR,
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& WRENCH
Beaver TOOL AND ENGINEERING
CORPORATION
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BEAVER TOOLS
ARE WORKIN' TOOLS!

B-RIGHT-ON®

SOCKET SCREW PRODUCTS

always measure up!

QUALITY B-RIGHT-ON PRODUCTS ®

Socket screw users who want *what* they want *when* they want it know it pays to specify B-RIGHT-ON! Brighton Socket Screw products *always* measure up. Standard or special, Brighton Screws must meet and pass factory standards that are higher even than those specified by the ultimate user of the screws. Rigid control, from initial steel selection to final packaging, certifies every screw as B-RIGHT-ON quality.

Selected mill supply houses, Brighton distributors, complete the control chain, assure the user of service and delivery as dependable as the screws. . . . B-RIGHT-ON service.

Write for descriptive literature . . . see how YOU CAN DO BETTER WITH B-RIGHT-ON.

THE BRIGHTON SCREW & MANUFACTURING CO.

1839 Reading Road
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Keep your eye on Buckeye

for everything new
in air and electric power tools!

LOCK BUTTON THROTTLE
(Also available with Lever Throttle)

HEAVY DUTY 90° ANGLE HEAD DRILLS

For HEAVY-DUTY applications—designed for minimum maintenance, built for maximum service. Compact, lightweight, lowest overall head height—for ease of handling, even in the tight spots.

No exposed moving parts to create a hazard for tool operator or damage to the work piece. All working parts, including bevel gears, bearings and spindle, are separate units, easily and economically replaced—individually—when worn. Available with ¼"-28 or 5/16"-24 thread, or with Buckeye Cone Jaw chuck, ¼" capacity.

Those are the facts about the NEW Buckeye 90° HEAVY-DUTY Angle Head Drills . . . we'll prove them, in your plant, without obligation. Just tell us where and when, we'll do the rest!

Buckeye Tools CORPORATION
DIVISION 14 • DAYTON 1, OHIO

producers of the world's first successful rotary air tools

● HIGH SHOCK RESISTANCE ● HIGH WEAR RESISTANCE

● HIGH HEAT RESISTANCE ● HIGH DENSITY

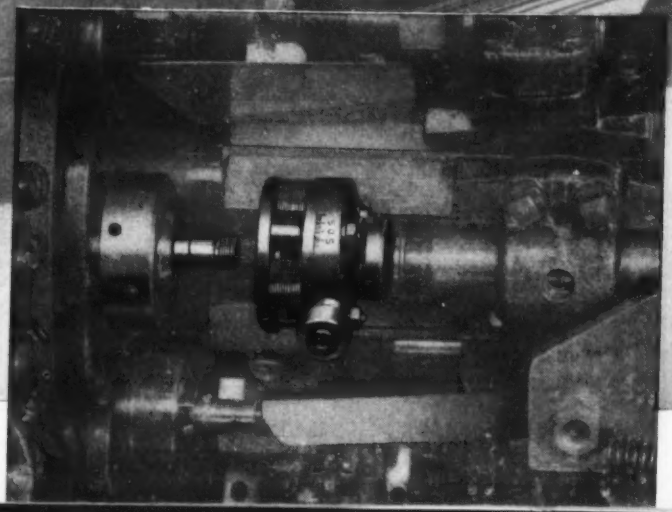
Plant after plant reports up to 50% increase in tool life with Grade 434. Used for removing large amounts of metal–minimum feed .015 and maximum feed dependent only on available horsepower. For top performance on your rugged steel cutting jobs specify Adamas Premium Grade 434!

"first with carbide that lasts!"

ADAMAS
TUNGSTEN CARBIDE®

ADAMAS CARBIDE CORPORATION, KENILWORTH, NEW JERSEY

3¼ miles of *rolled* threads...

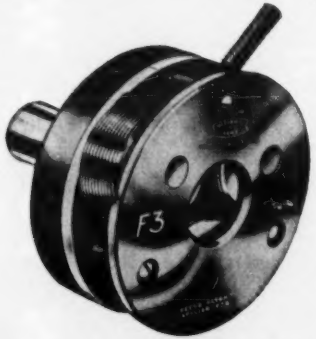


Style F-2 non-revolving type National Acme "PETTE" thread rolling head on end ring setup on ⅝" RA-6 Acme-Gridley bar automatic

and the National Acme

Piece after piece—at the rate of 1500 an hour—these brass

and the National Acme "FETTE" thread rolls are still going strong



National Acme "FETTE" Self-opening Thread Rolling Heads are used on automatics, turret or hand lathes, threading machines, drill presses, and other types of vertical and horizontal machines.

Design simplicity and rugged construction insures long life of head and rolls. Made in revolving type in capacities 7/16" to 1"; non-revolving type 1/16 to 3/4".

Ask for Catalog FRH-53

Piece after piece—at the rate of 1500 an hour—these brass end rings roll off a 9/16" RA-6 Acme-Gridley automatic. And with more than 627,000 pieces in the bin, the National Acme "FETTE" head is still rolling identical threads with the same set of rolls.

You don't have to figure it out. When you use these self-opening thread rolling heads you *know:*

- **threading speeds will be the same as high speed steel turning tool speeds**
- **threads will be more accurate, stronger and smoother by this "cold-forming" rolled thread process**
- **trouble-free performance of National Acme "FETTE" heads means uninterrupted production—less down time**
- **more "mileage" with a set of rolls means lower cost per piece**

Check the advantages of FETTE heads for your threading jobs — send sample or print for our recommendations, or ask our representative to call.

The NATIONAL ACME COMPANY

170 EAST 131st STREET • CLEVELAND 8, OHIO

Acme-Gridley Bar and Chucking Automatics: 1-4-6 and 8 Spindle • Hydraulic Thread Rolling Machines • Automatic Threading Dies and Taps • Limit, Motor Starter and Control Station Switches • Solenoids • Contract Manufacturing

A MODERN IDEA THAT SAVED MILLIONS!

The quick-change drill chuck was originated by Modern. It was and is one of the most outstanding contributions ever made to low-cost drilling . . . an idea that has saved millions of dollars in drilling time!

Simple, strong and sturdy, Modern-Magic Chucks will do an outstanding job for you.

MODERN TOOL WORKS

DIVISION

CONSOLIDATED MACHINE TOOL CORPORATION

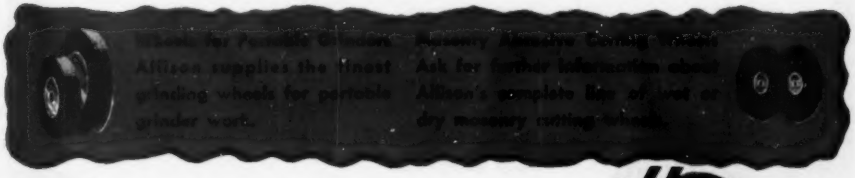
WHOLLY OWNED SUBSIDIARY OF FARREL-BIRMINGHAM COMPANY, INCORPORATED

ROCHESTER, NEW YORK

cut your costs . . . where you cut your materials

"Don't brag, McGee, we know you're good!"

Production managers who take the trouble to keep a careful, day-to-day record of cutting operations are quickly convinced of the efficiency and economy of the Allison Abrasive Cutting Method. The score is there for all to see. Abrasive cutting with Allison Wheels cuts time, cuts effort, and cuts waste. It pays off in more pieces per hour at a lower cost per piece. For almost all materials to be cut, there is an Allison Abrasive Cutting Wheel to fit the job. For complete information on wet or dry cutting, ask Allison . . . specialists in abrasive cutting for thirty years.



The *best* way to cut many materials . . .
the *only* way to cut some.

Allison
ABRASIVE CUTTING WHEELS

THE ALLISON CO., 264 ISLAND BROOK AVENUE, BRIDGEPORT 8, CONN.

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Quick-Change . . .

Manchester Cut-Off Tool . . .

● New P.D.Q. "Manchester" cut-off tool offers *15 SECOND* tool change. Loosen only one screw to change carbide insert. "V" design on support blade and insert makes this tool self-centering and highly accurate. Adjustable rear stop provides positive insert backing and quick adjustment after insert is re-ground.

Tools are available for turret lathes, engine lathes, automatics and cut-off machines... Write for literature and specifications covering *ALL* the new "Manchester" tool features.

PORTAGE Double-Quick TOOL CO.

1037 SWEITZER AVENUE • AKRON 11, OHIO

Featured IN THIS ISSUE

Coolants & Lubricating Agents in Band Sawing **151**
Time Study—Incentive Systems **162**
Special Report on Presses **248**

Coolants and Lubricating Agents in Band Sawing, by M. A. Bergson, The DoAll Company, features the use of coolants and lubricants in band sawing operations "because they materially prolong band tool life, improve cut finish and facilitate production." Page **151**

Incentive Systems Applied to Job Shop Operation, by Harold R. Nissley. This is part four of a series of time study articles. The author is a well-known authority on industrial engineering and time study. This article is devoted to answering questions asked most frequently as a result of two previous articles written by Mr. Nissley. Page **162**

A Method of Dimpling Titanium, by Frank Charity, covers a satisfactory method of dimpling titanium sheet stock with both stationary and portable squeezers developed by Aircraft Tools, Inc. Page **174**

Multi-Spindle Drilling of Radial Holes, by Clifford T. Bower, consulting tool engineer. Mr. Bower deals with one form of commercial engineering product which incorporates in its construction strips of metal bent to semi-circular form in which two holes are drilled radially so that their center lines intersect the origin of the semicircle radius. Page **181**

Cutting Forces: Their Effects on Milling Operations and Milling Cutter Selection, by Horace A. Frommelt, consulting engineer, is an authoritive article on cutting forces, and the author covers in considerable detail the relationship between the force and the rate at which it is applied. Page **186**

You Can Diversify Quickly, Economically . . . by C. F. Hotchkiss, president, Stow Manufacturing Co. Here's how a small company came up with a new product in a hurry using an outside design firm. Page **208**

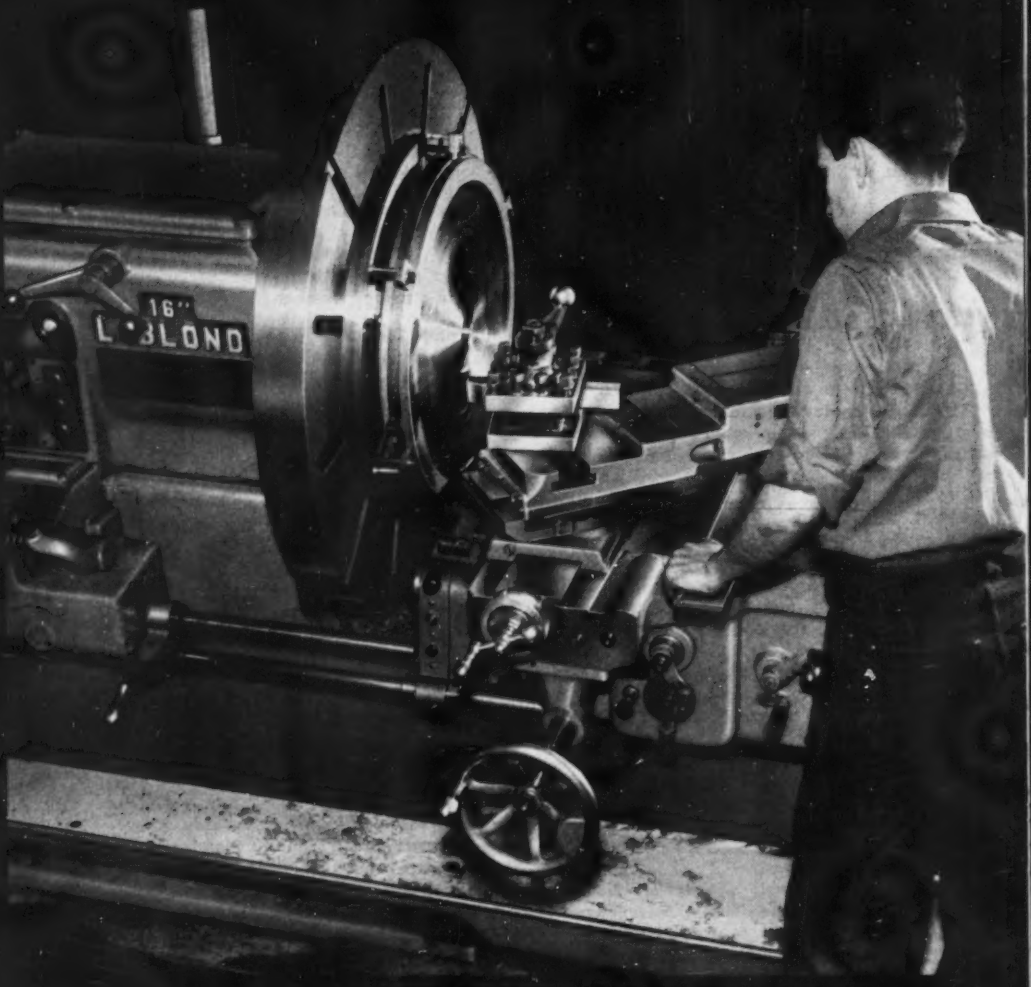
Measuring Diamond Wheel Performance, by F. J. Lennon, general superintendent, Kennametal Inc. Mr. Lennon gives several reasons why an actual "standard of performance" is so essential where any quantity of diamond wheels is used. Page **216**

Simple Revolution Counter, by George Middlebury. This article describes a revolution counter which is in the form of a 12 inch length of threaded rod, with a thread pitch of at least 40 t.p.i. Page **219**

"Conditions" are Important, by George Allison, management consultant. This Foremanship Forum article deals with the conditions under which a worker performs his daily duties. The conditions may be physical, mental or psychological in nature, and generally have little to do with contractural relationships, wages, hours of labor, etc. Page **238**

Carbide Dies and Punches Provide Maximum Economy in Forming, Piercing and Blanking Operations. The use of carbides has materially increased the life of dies in punching and blanking operations and other applications, and has completely changed industry's ideas of speeds and costs. Page **248**

"LeBlond Lathes help us



Turning Tough Titanium— A LeBlond 16"/38" Sliding Bed Gap Lathe with Hydra-Trace* performing the difficult job of contour facing a titanium forging. Columbia Machine Products likes the LeBlond for its smooth power, rigidity and versatility.

turn tough Titanium successfully"

...says *Columbia Machine Products, Brooklyn, N.Y.*

Turning titanium is tough. Columbia builds its success on licking problems like this, and dependable equipment plays a vital role. To Columbia that means LeBlond Lathes—for the smooth power, rigidity and versatility they need.

For example, take the job shown on the left. A jet engine rotor compressor disc is being machined from a titanium forging. This contour job is faced on a LeBlond 16"/38" Sliding Bed Gap Lathe equipped with LeBlond Hydra-Trace*. Operating specifications must remain Columbia's trade secret. We can say, however, that they must hold tolerances as close as .0005" and finish to 32 microinches.

Columbia explains, "Since these titanium forgings are extremely costly, yet have no chip or scrap value, we must have dependable accuracy and finish without spoilage. Speed is important, too, because of the substantial amount of material that must be removed. LeBlond Lathes have what it takes to do jobs like this successfully, at competitive prices. One word sums up our feelings about LeBlonds—Excellent!"

Whether you're turning tough titanium or more conventional materials, one of LeBlond's 76 lathe models will fill the bill—exactly! LeBlond offers a complete line of lathes from the 13" Regal to the 50" Heavy Duty. Also available are Sliding and Plain Bed Gap lathes; Hollow Spindle lathes; Dual Drive lathes; Tool Room and Rapid Production lathes. For the *right* lathe for your job, call your nearby LeBlond Distributor, or write us.

Ask for Catalog 54-J for a description of LeBlond's complete line.

*Hydra-Trace (Trade Mark, Registered U. S. Pat. Office) is LeBlond's heavy-duty hydraulic tracing attachment. Can be mounted in place of the compound rest on practically all LeBlond Lathes.

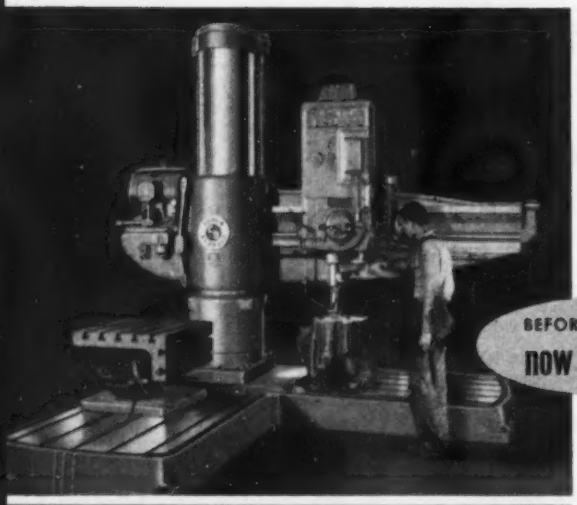
turned faster by

LeBLOND *of Cincinnati*

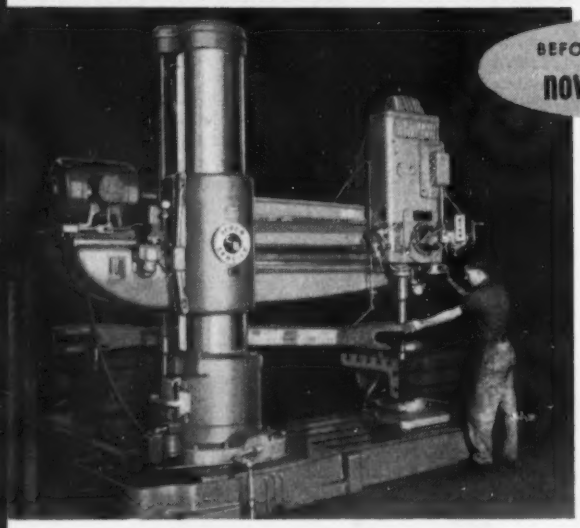
THE R. K. LEBLOND MACHINE TOOL COMPANY, CINCINNATI 8, OHIO

WORLD'S LARGEST BUILDER OF A COMPLETE LINE OF LATHES • *FOR MORE THAN 66 YEARS.*

BICKFORD cuts floor to floor time!



BEFORE 38 MINUTES
now 23 minutes



BEFORE 5 HOURS
now 3 hours

These two jobs are done with time savings at the Ohio Steel Foundry Company of Lima, Ohio.

The machine (upper illustration) is drilling breech rings for guns from 76MM to the 155MM size. In this tough material a 2½" diameter lead hole is drilled and opened up to a 3½" diameter with a core drill.

Machine, below, is drilling 3 5/16" lead holes in a 9-foot Ladle Vale. Holes are opened up with a single point boring tool. Time savings result from the outstanding ease of control, and the power and rigidity of Super Service Radial Drills.

For power, accuracy, easy handling, check on Cincinnati Super Service Radial Drills.

Write for Catalog R-29.

CINCINNATI
BICKFORD

RADIAL AND UPRIGHT DRILLING MACHINES

THE CINCINNATI BICKFORD TOOL CO.
Cincinnati 9, Ohio, U.S.A.

AS THE *Editor* SEES IT

An Old Idea and a New One

One of the oldest chestnuts still rolling around industrial circles is the idea that everything that is bought, or hired, must be measured in terms of cost. "How much does it cost?" is the first question; the second is, "Can we afford it?" In either case, the number of dollars spent is the final criterion whether a purchase should be made, or in the case of intangible services i.e., personnel, whether action should be taken.

This idea is as old as Methuselah. Today the most active perpetuators of it are the sheepherders of numbers and figures: accountants and bankers. It is good to have these bulldogs of the dollar pile around as watchdogs; however, any accountant or banker who persists in measuring everything by how much it will cost is out of his depth at the council table, he should be chased back to watching the dollar pile. It is not his job to add to the pile, nor to detract from it. Rest assured, as long as he persists in his old fashioned idea of cost nothing will be added to it!

The new thought, and yet not really new because a few leaders have been using it as a yardstick for expenditures for many years: how much will it increase my profits? how will it help keep us in profitable competition? In other words, we don't measure a piece of equipment in terms of cost, but in terms of how much profit. That's the only intelligent way to figure it, sheepherders and watchdogs notwithstanding.

This entire subject was suggested to me by an accountant for a medium sized plant. The works manager thought he ought to have a new turret lathe but the accountant was of nimble wit, quipped he, "Man, we haven't paid for the old one yet; besides, you already have four of them and they're running O.K."

This example can be duplicated ad infinitum. Plants throughout the country are filled with nimble wits with, unfortunately, the foresight and leadership of sheepherders.

We replace obsolete machine tools because they are losing us money every minute they clank and groan through their cycles. We replace them because they are no longer making the profit which we have a right to expect from the jobs which are running on those machines . . . we just don't make the profit we have a right to off the old clunkers!

No one suggests we should replace for the fun of it. We should replace our mossbacks because we must if we want to make the profit to which we are entitled and which it is possible to obtain from modern equipment.

I think many industries are running on a small margin of profit because they're not sufficiently equipped with modern tools to make a healthy profit.

Ah, well, if everything went according to accountants and bankers none of us would be in business now.

William F. Schleicher

Better Cuts Make Better Fits for Road Machinery Builder

This rugged machine is in service two shifts — 16 hours a day — five days a week shearing parts of various thicknesses and shapes for heavy earth-moving equipment. It is rated for mild steel 12' x 1".

THE ease with which good, square, accurate cuts are obtained has made the Steelweld Shear of a road machinery manufacturer very popular with the operators and shop management.

Experienced with various type shears, they know the importance of easy knife clearance adjustment. They know that the best cuts are obtained when the correct clearance is provided for each thickness of plate being cut. As they point out, improper knife clearance on any shear often results in a heavy plate being cut at an angle with respect to the thickness, or light gauge metal burring.

Adjusting knife clearance on Steelweld Shears is such an easy, quickly-performed task that operators take care of it automatically. Turning a hand crank until a gauge pointer is on the proper metal-thickness figure is all that is necessary — a task done in a matter of seconds.

The big time saving made on knife changing as compared with most shears is another factor greatly appreciated. Easily done in two hours on a Steelweld, this job frequently requires all day on other machines.

Steelweld's unusual pivoted-blade operating principle makes possible outstanding cost-cutting advantages. For the complete story, send for the catalog below.

GET THIS BOOK!

CATALOG No. 2011 gives construction and engineering details. Profusely illustrated.

THE CLEVELAND CRANE & ENGINEERING CO.

5240 East 282nd Street Wickliffe, Ohio

STEELWELD PIVOTED BLADE SHEARS

How's BUSINESS ?

New tax laws more liberal toward business

New York . . . The sweeping new tax code is estimated to have cut $1,363,000,000 from business and personal taxes this fiscal year. Perhaps twice that sum will be saved in future years.

The American Institute of Accountants, national professional society of certified public accountants, states that in general the new tax law is much more liberal toward business than the old one, some loopholes have been plugged and some provisions bear down a little harder.

Seven Main Areas

Seven main areas can be spot-lighted. But remember, every business has its own conditions to consider. No general statement should be applied without full study and consultation with an expert.

1. Depreciation write-off is greatly speeded. A much greater portion of the cost of **new** (not used) equipment can be written off in the early part of the useful life of the asset. Under one new method, for example, double the amount previously allowed can be written off in the first year. Obviously this is big news to a business that wants to modernize or expand.

The deductions are no greater over the entire useful life, but they are much greater in those years when the expenditure is most felt and before returns may begin to taper off because of obsolescence. Ask your tax adviser how the various new methods can help **you**—the "declining balance" method . . . the "sum-of-the-years'-digits" method . . .

Ask him whether a "switch" from one method to another might be advantageous. Be sure to note that some switches are automatically permissive and some are not, and that the kind of records you keep (or fail to keep) may defeat the benefit the law holds out to you.

If you have been leasing equipment instead of buying outright, you may want to re-appraise your practice in the light of the new laws. And perhaps you will want to look into earlier disposal of used equipment.

2. Research and development costs may now be deducted in the year they are incurred. You no longer have to wait to get a patent or give up your experiment as a failure before deducting your costs.

3. Tax accounting under the new law has been brought more nearly into line with generally accepted accounting principles. Income reporting can be more realistic. You can deduct from current receipts estimates of such future expenses as refunds and rebates, allowances for discounts, claims for damages, etc. You can report advance rentals in the years in which they will be earned and in which you will have expenses such as maintenance or repairs to deduct.

The estimated expenses can be deducted if you can make a reasonably accurate estimate based on your own experience or that of others in similar circumstances. Of course only those anticipated expenses which apply to the revenue of the current period may be deducted.

Altogether there will be less difference between taxable income and net income as it is figured by accountants for ordinary business purposes.

4. Partnerships and proprietorships

now may, under certain circumstances, elect to report and be taxed as corporations. Some businesses will want to take advantage of the lower corporate rates at certain levels, remembering, however, that once elected the practice must be continued unless there is a 20% or more change in ownership. And remembering, too, that though owners may escape an immediate high personal tax bracket by electing to report as corporations, assets kept in the business may later be subject to estate tax or income tax (as dividends or capital gains). Take care to look into all aspects with your C.P.A. before you change!

5. Retention of earnings for future expansion or modernization is made easier by the granting of a $60,000 accumulation-credit (total for all years). Also, if any part of a greater accumulation is deemed not for "reasonable needs" of the business, the penalty tax is applied only to that particular part, not to the entire accumulation for the year, as formerly.

Most important of all, burden of proof is now laid upon the Internal Revenue Service, not on you. In most cases, a business with legitimate savings for bonafide purposes of expansion or modernization need no longer fear the penalty tax.

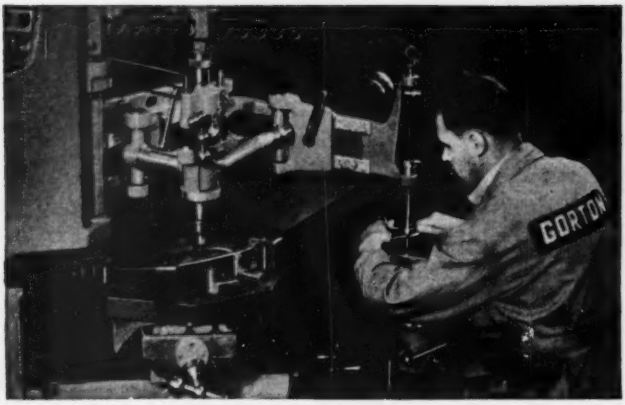
6. All is not sheer velvet, however, for the corporations. Those with an anticipated tax liability of $100,000 or more must make their tax payments earlier in the year. The process is to be stepped up gradually over a five-year period. A firm which uses the calendar year (fiscal year corporations will use corresponding dates) will pay 5% of its 1955 tax in September 1955, 5% in December 1955, and 45% in March and again in June of 1956. Each year the September and December payments will increase and the March and June payments will decrease until there will be equal instalments of 25% in September and December of 1959 and March and June of 1960.

Corporations with less than $100,000 of anticipated tax liability will continue to pay 50% of their tax in March and 50% in June of the year after the income is earned.

A penalty is applied for substantial underestimate of tax.

7. Under the old tax law, if you suffered a net loss one year, the impact might have been softened somewhat by a carry-back to the preceding tax year. This carry-back generally meant you received a refund of some or all of the taxes you had paid the year before. Any losses not absorbed in this way would be carried forward for as many as five years following your loss year. These carry-forwards would reduce your taxes in later years, but they were no help in bringing in immediate cash. Now the new law provides for a carry-back for two years instead of one, in addition to the five-year carry forward. In many instances, this will mean that greater refunds of prior taxes will be available to add to your working capital.

These are only the highlights. Over 3,000 technical changes have been made in this colossal overhauling of the federal tax code. You may have to lose some sleep before you understand all the provisions that are important to



Gorton Pantograph Does Job 7 Times Faster

In only 40 minutes this tracer-controlled pantograph cuts and blends a thermal slot in an 8-foot steel propeller blade — a job that requires 5 hours 10 minutes by other methods. This is typical Pantograph performance—one of hundreds of examples.

Gorton *Pantography* Brings Creative Production to Your Plant

What's *your* problem in machining? Depend on Gorton Pantography to help you *create* a new production method if your problem falls into any of these categories:

OPERATIONS

Inside profiling	Mold cutting	Grooving
Outside profiling	Counterboring	Graduating
Routing	Contour Milling	Engraving
Die sinking	Chamfering	

Gorton Pantography works in two or three dimensions, in all directions, horizontally *and* vertically on ferrous or non-ferrous metals or in plastics. Easily made, inexpensive enlarged masters are employed and work is done at a reduction ratio which increases accuracy — an exclusive pantograph benefit.

Whether a dozen or a thousand pieces, each is identical in shape and tolerances to the first. Operation during cutting cycle is manual or automatic, and work piece size varies from the diameter of a dime to areas as large as ten feet.

Clip the coupon for your copies of the Gorton catalog and the helpful booklet, "Pantography."

GEORGE GORTON MACHINE CO.

1411 Racine St., Racine, Wis., U.S.A.

Please send at once complete information about the Gorton line contained in Bulletin 1655-1411.

Firm_____

Name_____

Title_____

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A 7787-1P-A

It's the built-in quality that counts

COLUMN OR BENCH TYPE
SPEEDS UP TO 12000 R. P. M.
12″ SWING

A HIGH CLASS TOOL to meet the requirements for *Precision* and *Production Drilling*.
CAPACITY—From very small number size drills up to ½″ in cast iron.
Built-in Work Light on all spindles.
Telescopic Spindle Guard.
Rack and Pinion operated Motor plate—easily adjustable for proper belt tension and speed changes.
Clock Spring fast acting spindle return.

Write for Bulletin

THE AVEY DRILLING MACHINE CO., Cincinnati 1, Ohio

your particular business. But once you do, chances are you'll be happier with the new law than you were with the old.

Machine Tool Builders Wanted

Los Angeles. . . Steel producers on the west coast are campaigning for machine tool builders to open plants here. The campaign is being conducted jointly by chambers of commerce, railroads, utilities, banks and steel producers. They want to show that materials and markets are here, ready for the manufacturer.

And as bait, they are offering—for free—special services which consist of commercial research, market development, metallurgical advice, credit counsel, traffic and transportation help and advertising counsel.

To back up their campaign, the steel producers claim the west coast receives 2,500,000 tons of products using steel in their manufacture from the East and Midwest annually. These products consist of 1,500,000 tons of motor vehicles and parts, 200,000 tons of machinery and parts, 100,000 tons of agricultural equipment, 250,000 pounds of household appliances, 200,000 tons of electrical equipment and 250,000 tons of various other fabricated steel products.

The west is depending more and more on its own output, and a high degree of self-sufficiency has now been reached. The producers say that many more steel products could be manufactured in the West at a satisfactory profit.

Fourth Quarter Brighter

Washington. . . Since the new tax bill became law, the number of actual orders received by the machine tool industry has increased sharply. And there appears to be justification in the belief held by many machine tool builders that fourth quarter business will show a substantial increase.

Under the new law, purchasers of machine tools can amortize them faster than formerly, making replacements of obsolete machines more economical. Many customers have admitted they were holding back orders to make sure of the new provisions.

As a result of this improved tone of the market, the machine tool industry is hopeful of doing around $225 million worth of business in the final quarter as compared with approximately $370 million in the first eight months of the year. However, backlogs of individual companies continue to show wide variations, with some indication that much of the new business is going to a score or so of the larger companies.

Studebaker-Packard Financing

The automobile industry is keenly watching the Studebaker-Packard financing program.

The new corporation has arranged a $70 million loan, consisting of a $25 million loan from three large insurance companies on 20-year, 4% notes, and a $45 million credit has been established with 21 commercial banks, headed by

"Because you've done such a splendid job of running errands and cleaning out the waste baskets, I'm promoting you to chief engineer. Run along now, son, and tell mother I'll be late for dinner."

Chase National, at the prime rate. This is the rate charged A-1 borrowers and is currently 3%. The actual dates and amounts for take-down from this credit have not yet been set.

Both H. S. Vance, president of Studebaker, and James Nance, Packard president, have a hopeful outlook for 1955.

The factory delivered retail prices of the 1955 Studebaker have been reduced by amounts varying from $37 to $287 in anticipation of at least a 20,000 monthly volume of cars and trucks and lower operating cost as a result of the merger. These new prices will put Studebaker's six-cylinder models within $30 of Ford sixes and within $60 of Ford's V-8's.

Mr. Nance predicted that it won't be until the 1956 model year that the economies from the merger will be substantial. In that year, he said, Studebaker and Packard will have more common tooling and interchangeable parts.

Paul Hoffman, chairman of Studebaker, stated that until "we get beyond 15,000 vehicles a month, we will be operating on very little or no profit." The eventual target is 30,000 units a month on a two-shift operation. He said Studebaker will operate on full-week schedules for the rest of this year. Through most of 1954, the company has shut down every other week, or has operated on a four-day week.

The 1955 Studebaker models include a new deluxe line called the President. This line includes two sedans, a hardtop convertible and coupe. It is bigger than the former Studebaker Land Cruiser. President models have a 120½ inch wheel base compared to 116 inches of the Land Cruiser. It also has a 175-horsepower V-8 engine, most powerful in Studebaker history.

Christmas Orders Show Promise

Christmas orders are reported to be going well. Most retailers are anticipating big volume business at Christmas this year. Prices are expected to be about the same as last year, but quality will be noticeably better. The prospects for good Christmas trade affect most lines of business and show that Americans are still spending freely.

Advertising Cited as Antidote for Recession

Washington . . . The Chamber of Commerce recently urged business to step up its advertising program to ward off a possible recession.

Although business conditions are steadily improving and confidence in the future is firm, individual businesses may be finding their markets falling away. "And," the National Chamber states, "there is always a possibility of general recession."

Often, in these circumstances, business will cut advertising and other sales expenditures. There are good reasons why this is the exact reverse of sense.

Some of these reasons are:

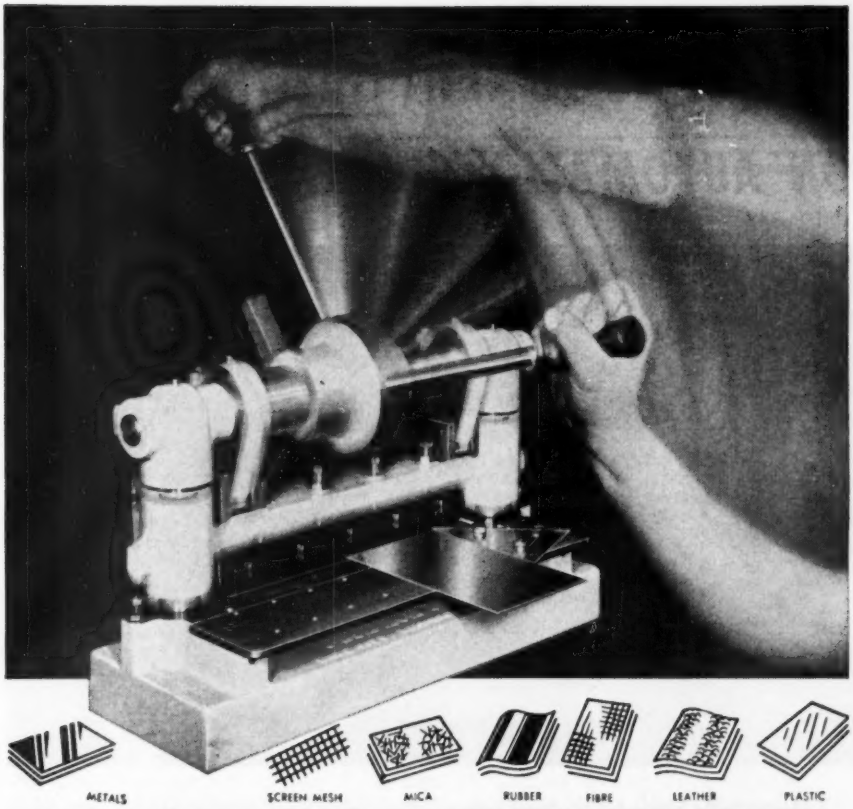
1. Advertising preserves brand names and their reputation.

2. Unless a business advertises regularly, buyers may shift to competitive brands.

3. Even during a recession, there is a new generation of buyers in the making that needs to be told about the products.

4. Once the public is allowed to forget a product, years may be needed to re-establish it.

"World War II provided a perfect laboratory for the testing of arguments for and against advertising when normal buying habits are interrupted. The arguments in favor of advertising won hands down," the Chamber of Commerce went on to say. Some companies stopped advertising during the war and later regretted it, for it was the firms who advertised even when there was relatively little to sell who were on top of the heap when the market became competitive again."



Want *HIGH SPEED* PRECISION SHEARING?

Check These Features and You'll want a Versatile DI-ACRO* SHEAR

- **PRECISION**—strips less than .025″ wide accurately sheared and duplicated.
- **CUTTING SPEED**—rivals power machines.
- **RATED CAPACITY**—16 gauge steel.
- **EASY TO OPERATE**—a woman can operate it with minimum effort.
- **CHOICE OF MODELS**—available in four sizes. Widths from 6 to 24 inches. Four power models.
- **ENGINEERING SERVICE**—always available.
- **PORTABLE**—readily moved about.
- **RUGGED**—backed by year warranty.
- **DELIVERY**—immediate on most models.
- **COST**—that's good too.

*pronounced Die-ack-ro

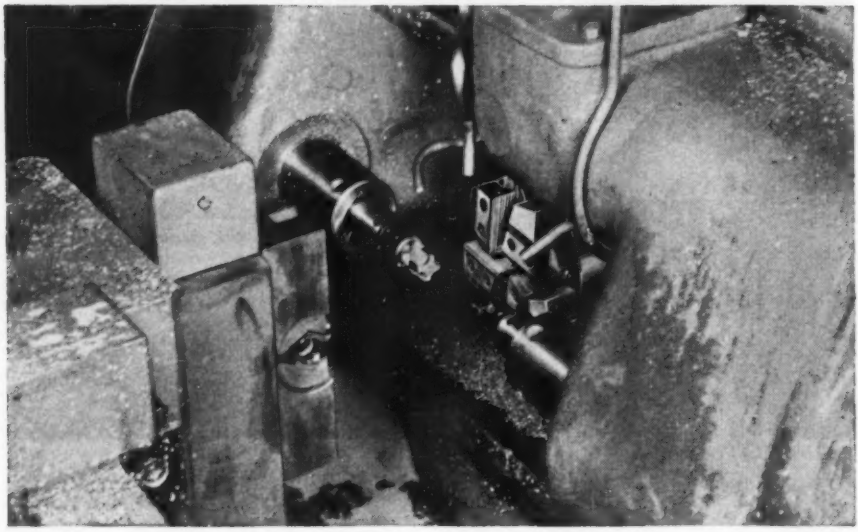
LIKE MORE INFORMATION? ***Send for 32-page catalog***
Gives full details on both hand and power operated Di-Acro Shears, Benders, Brakes, Notchers, Punch Presses, Rod Parters and Rollers. Write now.

di-acro PRECISION METALWORKING MACHINES

Creators of "DIE-LESS DUPLICATING"
O'NEIL-IRWIN MFG. COMPANY, 314 8th Ave., Lake City, Minn.

57% Less Threading Cost

ON AUTOMATIC CHUCKING MACHINE



A LANDIS Solid Adjustable Die Head cut the cost of one threading operation in the plant of a large Middle Western manufacturer by 57%.

The operation, performed on a Goss and DeLeeuw Automatic Chucking Machne, required the cutting of a 1-11/16" diameter 14 pitch thread ½" long on cast brass valve bodies. Prescribed tolerances were easily maintained.

The LANDIS Head fit perfectly into the high-speed cycle of the chucking machine, and produced on an average of 210 finished pieces per hour, revolving at 385 RPM. Major factors in the efficiency of this LANDIS Head were low down-time and low tool cost, occasioned by long tool life. Output of finished pieces averaged from 4,000 to 5,000 between chaser grindings.

Please send job and machine specifications with your request for additional information.

MC-336

LANDIS *Machine* CO. WAYNESBORO PENNA., U.S.A.

LAST MINUTE WASHINGTON NEWS

★★★

by Arnold Kruckman

Washington Correspondent

PROMINENCE OF DEFENSE AGENCIES IS STEADILY INCREASING

The agencies especially devoted to defense-what they are doing and their future purposes-are looming larger in the news day after day. If we were to trace all the defense activities, through all the agencies of the Government, we undoubtedly would find that many people are employed in so-called defense activities whose help could easily be made needless. But Government, especially large Government, has an inevitable tendency to expand and continue to expand. This is happening in the U.S.A. constantly, and the taxpayer pays the bills to maintain the jobs that are carried on by hundreds-probably thousands-who aren't sure what their jobs really are intended to do.

It should be made clear here, however, that the work of the two chief civilian defense agencies very definitely appears to be necessary. The fact of its need is brought home to us here by the increasing visits from men in industry and in business who earnestly strive to learn what preparations they should make in the event that civilian defense is essential.

SHOULD INDUSTRY HAVE CIVILIAN CLASSIFICATION?

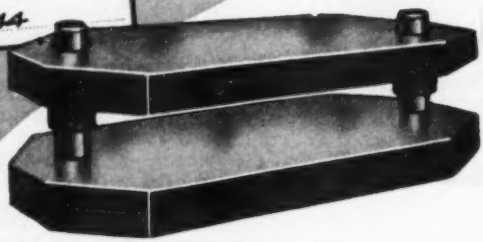
We still classify industry, and other commercial activities, as civilian. There are those in Washington, however, who insist that most of industry should no more be classified as civilian than the soldiers. Governor Val Peterson, head of the Civil Defense Administration, recently asserted:

"In the past two wars American industry was a dominant factor in winning the wars. Our military victories were based, without question, on the U.S. industrial output. Today, it goes without saying, that never again will an initial assault be directed alone against our military forces, leaving our production centers intact. Today a single flight of enemy planes can carry more destructive power direct to our industrial centers than fell on all of us and Britain in all the years of World War II. To lose, you lose enough productive people and plants-quickly enough-to demoralize the rest of the nation's defense

USE DETROIT DIE SET

DIE SET NO. OR STYLE SSD-2
DIE SPACE "A" 45" "B" 30"
THICKNESS OF SHOE "C" 3"
THICKNESS OF PUNCH "D" 3"
DIA. OF SHANK NO shank
LENGTH OF PIN 12"
STYLE OF BUSH Steel Shoulder
PREC. OR COMM'L Precision
JOB NO. 5-1044

sure way to get a quality die set



"USE DETROIT DIE SET," stamped on your blueprint, means you have specified a die set for accurate die work, fast mounting and long life . . . because of Detroit's high standard of factory-built and factory-tested precision.

Detroit DIE SET CORPORATION

2895 W. GRAND BLVD.
DETROIT 2, MICHIGAN

Call "Detroit"

DETROIT . . . TR 2-5150	FLINT, MICH. . . . 5-7361	NEWARK . . MA 2-4318
BALTIMORE . . . PL 2-4641	GRAND RAPIDS, MICH. CH3-1895	NEW ORLEANS . RA 6528
BIRMINGHAM, ALA. 54-8621	GREENSBORO, N.C. . 4-7655	ORLANDO, FLA. . . 2-3747
BUFFALO . . . CI 0163	INDIANAPOLIS . . HU 5604	PHILADELPHIA . . VI 4-4084
CHICAGO . . . PU 5-0500	KANSAS CITY, MO. VI 3558	PITTSBURGH . . LO 1-4011
CINCINNATI . . HU 7775	LOS ANGELES . . AD 7251	ROCK ISLAND, ILL. . 8-2814
CLEVELAND. . . TO 1-0860	MILWAUKEE . . GL 3-7170	ST. LOUIS . . . FR 1-6810
DALLAS . . . TE 5029	MINNEAPOLIS . . OR 5-7980	SEATTLE. . . . EL 1454
DAYTON . . . HE 3042	MONTREAL, CAN. . GL 6126	TOLEDO . . . MA 4510
DECATUR, ILL. . . 8-3474	NASHVILLE . . . 6-2597	TORONTO, CAN. . KE 2972
DENVER. . . . SH 2451		WASHINGTON, D.C. AD 4-5700

production and destroy the nation's will to resist. Such losses can be suffered quite readily by any industrial nation. One such detail sticks in my mind about mobilization speed. It took us twenty months to get going with a full flood of defense production, after Pearl Harbor, despite the fact that no enemy laid a hand on us here at home. In this atomic age you don't get twenty months to shift your productive machinery into high gear.

DROP IN WORKERS' MORALE LOSES WARS DESPITE ARMS

"It is worth pondering that only 15% of Germany's machine tools were ever destroyed in all those years of the most savage and sustained bombing attacks the world has known. It was not the plants and machines which gave out under those assaults; it was the men who ran them. You can repair machinery and rebuild plants in a comparatively short time, as the Germans proved over and over again. It may take ten years to train a skilled industrial worker; and when you lose him, and enough like him, you have lost a war. There are two ways to put a skilled workman out of action. You cripple or destroy him physically; or you destroy his morale. It isn't enough to brace his morale by making his factory job secure—or comparatively secure; you've got to help protect his wife and his children, and all the other things he works for. Germany lost the war more through failure of civilian morale, than through lack of machines or military manpower. So did Japan. Modern wars are lost by men whose homes are wiped out while they are at work, together with everything they own; by men whose wives and children have been killed or wounded or dispossessed. Some representative industrial and business concerns have faced the Civil Defense problems squarely and contributed their organizational ability and constructive know-how to its solution. Far more have not."

GROUP FROM STEEL INDUSTRY ISSUES DEFENSE MANUAL

The men and women who come to Washington from industry, and every other kind of business, to learn what they can do in order to prepare for any emergency, usually are referred to Charles P. Redick, Acting Director, Building Materials and Construction Division, Business and Defense Services Administration, who counsels them to gather their detailed information in Washington, from the sources which he suggests to them, and then go home and interest the people in their community as well as in their business to cooperate in organizing the defense measures. There are 25 industry divisions represented in BDSA, and there are almost 600 industry defense committees which draw their inspiration from BDSA. However, a considerable part of BDSA heads up in the division headed by Mr. Redick. Recently he had a good deal to do with the work of the task group from the iron and steel industry which brought out the Industrial Defense Planning Manual for iron and steel, issued late in September. The Manual virtually is the model for the other BDSA industry divisions. It keenly interested the Director

For Accuracy and Alignment

The BAKER

MODEL O KEYSEATER

The Baker Model O Keyseater has ample capacity to cut keyways in mild steel up to 9″ long x 1″ wide at a feed of .005 inches. Machine is furnished to take standard cutter bars of ½″, ⅝″, 13/16″, 1″ and 1 5/16″ diameter. Baker Keyseaters maintain utmost accuracy and alignment in the finished keyseat. Write for full details.

BAKER BROS. INC., Toledo, Ohio

DRILLING . . . TAPPING . . . KEYSEATING . . . CONTOUR GRINDING MACHINES

of BDSA, Charles F. Honeywell, and in all likelihood has his active cooperation in its assembly. The Manual covers 43 pages and was issued by the American Iron and Steel Institute, 350 Fifth Avenue, New York 1, N.Y. As a preface it carries a letter from Secretary of Commerce Sinclair Weeks. He call its publication "a splendid example of how a great, patriotic industry can cooperate with Government in valuable public service.

"I believe it is of tremendous importance to national security for executives in each enterprise connected with iron and steel to study this highly vital manual. As a result they will be able to solve their defense problems more swiftly and wisely. Leaders of other industries will be helped by adapting to their fields the practical guidance so effectively presented here."

The general sweep of the book can be gathered from its table of contents. After the introduction there is a striking illustration of the effect of H-bomb destruction.

Sections are devoted to administration, personnel, security, training, medical, rehabilitation. A carefully defined industrial defense organization chart is supplied.

SECURITY AGAINST ENEMY ATTACK VITAL NOW AS IN PIONEER DAYS

One of the leaders in devising civilian defense points out the striking fact that not since pioneer days have Americans had to make security against enemy attack a major consideration when they laid out their communities and arranged their domestic and business lives. The necessity for non-military defense today is as great as was the need for individual participation in mutual defense during Colonial and frontier times. For the first time in 175 years we Americans are compelled to sit down and think out ways of defending ourselves intimately on the home front. It is interesting to learn that the non-military defense area of the Office of Defense Mobilization contains these divisions: Continuity of Industry, concerned with what we call industrial defense; Continuity of Government, concerned with measures to keep the essential functions of Government in operation in event of attack; Physical Security, concerned with special protection for the most vital industrial governmental facilities; Urban Targets, concerned with reducing the vulnerability arising from the excessive concentration of population and industry in a limited number of great cities. The development of policies and programs rests upon an Industrial Defense Committee, consisting of representatives of the Departments of the Treasury, Defense, Interior, Agriculture, Commerce, Labor and Health, Education and Welfare; the Federal Civil Defense Administration, Federal Reserve System, General Services Administration, Housing and Home Finance Agency, and Small Business Administration. The Facilities Protection Board, established by Presidential orders, assists ODM in the development of technical standards and programs for the physical security of the most important industrial and governmental facilities.

Time Study

Mr. Nissley has certainly done a fine job on Part 2 of his series on Time Study. Unfortunately for me, I missed Part 1 and may miss the remaining Parts 3 and 4.

Letters to the Editor also mention an article, "How To Make Your Time Study Standards More Accurate," in the March issue.

Would it be at all possible to send copies of all five of these articles? If not, I will appreciate any copies that you may send.

Roy L. Christoph,
Asst. Supervisor Methods Dept.
American Meter Co.

. . . appreciate receiving tear sheet copies of Mr. Harold R. Nissley's article on Time Study, Parts 1 and 2.

I would also appreciate receiving copies of his future two articles when they appear.

E. Murray Taylor, Tool Engineer
Sarnia, Ontario

Please send me a reprint of Part 1 on Time Study by Harold R. Nissley, August, 1954, BLUE BOOK.

I would also like a reprint or tear sheet of the article "How To Make Your Time Studies More Accurate," March, 1954, issue.

K. Mills, Time Study Engineer
Meilink Steel Safe Co.

Various supervisors in our organization receive the MACHINE and TOOL BLUE BOOK regularly . . . I was able to read articles in the March and August, 1954, issues. These articles were on Time Study and were written by Harold R. Nissley.

Would it be possible to obtain permission or authorization to copy these articles to distribute them to our Time Study men? The authorization would also apply to the succeeding articles in the series.

R. Klubertanz, Standards Analyst
Kearney & Trecker Corp.

Tear sheets have been sent. Originally only four or five articles were under consideration, but the interest has been so acute that it has been decided to extend the series to cover additional time study subjects. Delighted to have K & T reprint the articles.

Information Please

Our company fabricates Stainless Steel Equipment. We wish to modernize and overhaul our entire grinding and polishing setup.

Can you refer us to companies that manufacture polishing and grinding equipment for this type of work? Your cooperation in this matter will be greatly appreciated.

Max Merdinger, President
Curtis Equipment Corp.

Would it be possible for you to make recommendations regarding a handbook that would be helpful in the various fields of tool room estimating? We would appreciate it very much if you would make such recommendations, along with where they can be supplied and their costs.

Andrew Losch
The Hubbel Machine Co.

Our machine shop wishes to purchase for a special job a scale or ruler approxi-

mately two feet long which will be accurately scaled by markings 1/1,000 of an inch apart.

A microscope to make the markings visible should accompany the rule.

We have searched through your advertisers for the past several months but have found nothing of this type advertised and are wondering if you know of a supplier for such a scale.

Stuart J. Myers, Treasurer
Warren Plastics Corp.

Information to the best of our knowledge sent.

Turning Spherical Radii

I read your article on the "Spherical Turning Device" in the June, 1954, issue of the MACHINE and TOOL BLUE BOOK.

Will you please send me additional information on turning spherical radii. I am primarily interested in learning the formula used in turning spherical radii accurately by this method.

Louis Marschok,
Methods Engineer
The W. L. Maxson Corp.

Your letter in connection with my short article on a Spherical Turning Device which appeared in the June issue of MACHINE and TOOL BLUE BOOK has been forwarded to me by the editor.

The main attraction of the pointed spherical generator lies in its simplicity. There is really no formula involved; the distance or length between the pin ends is equal to the radius of the sphere required on the work. This length can be measured accurately by means of a micrometer or other precision measuring instrument.

The accuracy of the sphere generated is dependent on the precision with which the length of the pin is made and on the setting up of the cutting tool and the pin in the lathe.

The cutting tool point must be set precisely at lathe center height; by means of a vernier height gage or some similar tool. Three methods of setting cutting tools precisely at lathe center height were described by me on pages 181 to 184 in the February issue of the BLUE BOOK. Any of these methods may be used.

Another important point about the cutting tool is that its cutting point must intersect the lathe spindle axis when the pointed pin generator is lying with its axis parallel with the lathe spindle center line. This is best visualized by imagining you are looking down on the lathe from above so that you see it as a plan view.

As stated in the article, the pointed pin causes the cutting tool to travel through an arc and it cannot travel through an arc with an inclusive angle greater than about 90 degrees, or a quarter circle. Any greater angle of travel will cause the pin ends to jump out of the center pops in the saddle and tailstock castings.

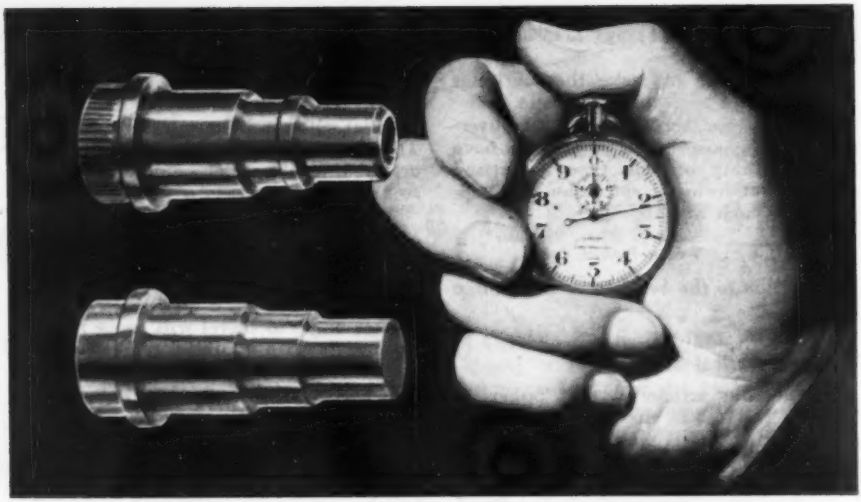
I have evolved numerous spherical turning devices for the generation of accurate radii required in ball and socket joints and pre-combustion chambers for diesel engines. Each device was tailored for the machine on which it had to be used and for the rate of output required. It is almost impossible to generalize about spherical turning devices but if you have a specific problem, I would be happy to hear more about it and suggest some sort of tooling which may help you.

If you care to let me have a rough sketch or component drawing of the piece or work which you want to produce I would be glad to work up a tool design, provided that it could be used in the future as an article in MACHINE and TOOL BLUE BOOK. In this case, design would not cost you anything.

I am pleased that you found the article of sufficient interest to write me about it.

Tom Brown,
Consulting Tool Engineer
London, England

Mr. Brown has informed me that he will be happy to extend the same tooling design service to other manufacturers. He requests that he be consulted only about those jobs which will require original tooling; also, he is not interested in either presswork or die casting operations, but only in machining setups. Do not query about processes, methods, or any other phase of manufacturing which would require the services of a consulting engineering firm. But if you have a knotty tooling problem, maybe we can help you.



Finished 50% faster

Using Ledloy from Ryerson

By the time the B-1113 piece was finished, you'd be halfway through a second Ledloy piece. Such greater speeds and feeds are possible with Ledloy because Ledloy contains a *built-in lubricant* which substantially reduces the friction between the steel and the cutting tool.

That built-in lubricant is *lead*—so finely dispersed through this free-machining, open-hearth steel that you can't see it with a microscope. The addition of this small percentage (.15-.35) of lead has no effect on the mechanical properties of the steel EXCEPT to greatly increase machinability.

Ryerson Ledloy machines up to 50% faster than B-1113 . . . tool life is extended as much as 200% . . . and net savings of 25% and more are effected. And Ledloy machines to an unusually clean, smooth finish—case hardens effectively — and bends, crimps, swedges or rivets easily. Ask your Ryerson representative for the facts about Ledloy or write us direct for engineering data. Ryerson was the first to stock Ledloy and today your nearby Ryerson plant carries the world's largest stocks of Ledloy rounds, squares and hexagons in a wide range of sizes for immediate shipment when you call.

Principal Products: Bars, Structurals, Plates, Sheets, Tubing, Alloy Steel, Stainless, Etc.

RYERSON STEEL

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • CHARLOTTE, N.C. CINCINNATI • CLEVELAND • DETROIT • PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS LOS ANGELES • SAN FRANCISCO • SPOKANE • SEATTLE

Coolants and Lubricating Agents in Band Sawing

By **M. A. Bergson,**
The DoALL Company
Des Plaines, Illinois

THE USE of coolants or lubricants in band machining operations is desirable since they materially prolong band tool life, improve cut finish and therefore facilitate production. In some cases, cutting cannot be done successfully without the use of such agents.

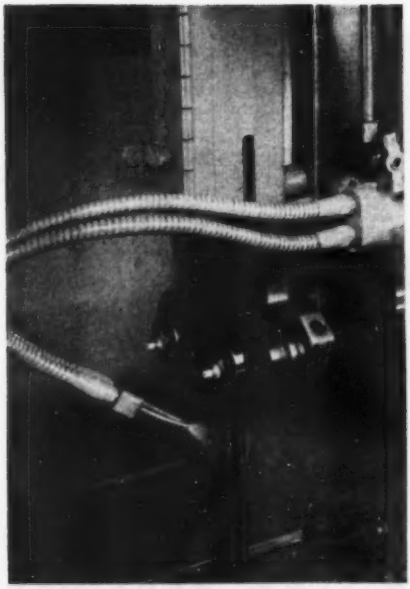
Coolants, usually liquid type agents, are employed to prevent build up of excessive heat in the work. Lubricants reduce the amount of friction between the tool and the work and prevent abrading of the tool and loading of the gullets. These difficulties are likely to occur in the cutting or filing of extremely tough, highly wear-resistant or abrasive materials. In general, the recommendations made in the following discussion for sawing operations are equally applicable to band filing operations.

Use of Coolants and Coolant-Lubricants

Under the category of coolants there are agents the sole function of which is to provide a cooling effect, i.e., to reduce the temperature of the cutting tool and the material being cut. Certain coolants, however, are endowed with lubricating properties which provide a lubricating as well as a cooling action. These are used in the cutting of materials where excessive heat is generated but where the material is, to a limited degree, tough and abrasive. Such agents may be classified as coolant-lubricants and are generally mixtures of a cooling and a lubricating agent.

Plain water is a good example of an agent whose sole function is cooling. It may be used on materials which are not tough or abrasive but which have great frictional effect and generate much heat in their cutting. Typical materials of this kind are rubber tires and celluloid.

Coolant-lubricants used in sawing practice are generally a mixture of water and a lubricant; for example, a water-soluble oil or glycerin. A mixture



Spray lubricator on a Band Machine. Intensity of spray on Band Tool cutting edge is controlled with coolant and air valves at right.

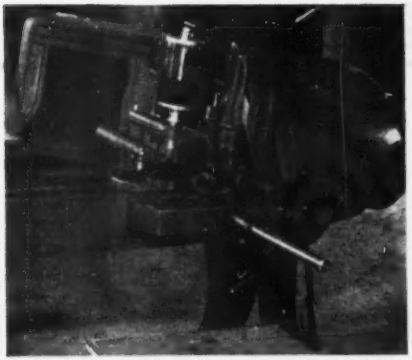
of 80 parts of water to 20 parts of this oil affords efficient cutting of such nonferrous materials as aluminum, copper and certain nickel-chrome alloys. This type of coolant-lubricant is also used in the cutting of certain plastics, including polystyrene, Plexiglass and Lucite. The percentage of soluble oil in the coolant may be increased in those instances where the material has a slight abrasive effect.

In line grinding and diamond cutting operations on hardened alloys, geological materials, etc., a coolant-lubricant is also recommended. This should be applied voluminously to keep the cutting elements flushed clean of the cut particles and to prevent damage to the Line Grind or Diamond Tooth Saw Bands.

A coolant-lubricant consisting of a mixture of water and glycerin is sometimes used for cutting certain rubber compounds.

Due to the large volume of coolant-lubricant needed to band machine magnesium alloys and castings effectively and keep the fire hazard at a minimum, it is recommended that only mineral oil type cutting fluids be used, winth specifications as follows: specific gravity 0.79 to 0.86, viscosity (Saybolt) at 100° F., up to 55 seconds, flash point 160° F., saponification (max.) 0.2%. Solid-type lubricants with a wax base, described under "Lubricants," are also

Tube of graphite-compounded grease attached to saw guide mounting. By dripping or squeezing, the lubricant passes through the mounting and lubricates the back of the band and the guide bearings.



Drip applicator shown mounted on a horizontal cut-off saw. The cutting oil is dripped directly into the Band Tool gullets. Rate of drip is variable.

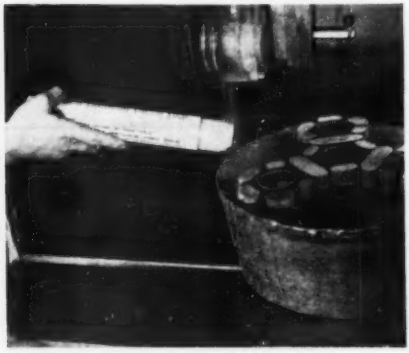
used for high production cutting of magnesium.

Lubricants

Agents employed primarily for lubricating properties include liquid type agents such as cutting oils, semi-solid type such as greases and "solid" type lubricants.

Among the fluid lubricants compounded for sawing use are those commonly classified as cutting oils. Oils of relatively low viscosity are used for cutting tough nonferrous metals and alloys—materials such as the various bronzes, certain aluminum alloys and alloys containing a very small percentage of iron such as Monel metal. Heavier oils, more heavily sulphonated, are used for sawing tough steels and ferrous alloys since such oils are better able to withstand extreme pressure and abrading action.

A solid-type lubricant is here applied by hand.



Grease-type lubricants are used to lubricate the sides and back edge of the band and the guide bearings, particularly where high band velocity is involved. Such lubricants are frequently compounded with graphite and supplied in tubes. On some tubes, a threaded nozzle permits the tube to be screwed into a grease fitting associated with the saw guide mounting. Contents of the tube can then trickle through or be squeezed through apertures in the mounting. The tube can be allowed to remain fastened to the mounting until it is empty.

'Solid" lubricants are finding great utility in sawing operations. These are usually compounded of wax substances, many are impregnated with high film strength lubricants. Normally, a solid-type lubricant is supplied in stick form, i.e., in a cardboard tube from which it is pushed out for use. A good solid lubricant is recommended for sawing metals, hardwoods and other materials where the use of a surface lubricant is preferable to a circulating type. It is applied directly to the band tool between cuts. For high production applications, however, it may be more convenient to use fluid lubricants since they can be circulated automatically with a resultant saving in time.

Frequently, in band filing of nonferrous metals the file segments may become so loaded that they are difficult to clean. Solid wax-type lubricants have been used effectively here to prevent this loading. The lubricant is applied directly to the filing surface.

Such lubricants are also used to pre-

COOLANT OR LUBRICANT RECOMMENDATIONS FOR SAWING VARIOUS MATERIALS

Material	Lubricant or Coolant	Other Data
Aluminum; sheet, rod, bar, press forgings (2S, 3S, 4S, 11S, 17S)	coolant-lubricant	Use spray applicator. Apply at point of cut. Use Precision saw band; for thicknesses 1" and over use Claw Tooth. For band filing use solid wax-type lubricant to prevent loading.
Autobestos and Raybestos (Brake Lining)	coolant-lubricant	Use Precision saw band; for thicknesses 1" and over use Claw Tooth saw band.
Commercial Brass Sheet (SAE No. 70) quarter hard to extra spring	None	Use Precision saw band; for thicknesses ½" and over use Claw Tooth saw band. For band filing use solid wax-type lubricant to prevent loading.
Atlas 90 and Auromet 55 Aluminum Bronze	Use light cutting oil	Use Precision saw band; for thicknesses 3" and over use Claw Tooth. For band filing use solid wax-type lubricant to prevent loading.
Burlap, Jute, Flax, Manila or Hemp	None	Use Knife-Edge band; for thicknesses ½" and over use Scallop-Edge.
Felt (woolen or cotton)	None	Use Knife-Edge band; for thicknesses ½" and over use Scallop-Edge.
Granite (Igneous)	coolant-lubricant	Use Line Grind band. Apply coolant voluminously.
Optical Glass	coolant-lubricant	Use Line Grind band; for thicknesses ½" and over use Diamond band. Apply coolant voluminously.
Magnesium Die Castings SAE 501	Mineral Oil	Use Precision saw band; for thicknesses 1" and over use Claw Tooth. For band filing use solid wax-type lubricant to prevent loading.
Bakelite (no filler)	None	Use Precision saw band; for thicknesses 1" and over use Claw Tooth.
Polystyrene	coolant-lubricant	Use Precision saw band; for thicknesses 1" and over use Claw Tooth.
Buna Rubber	Glycerine and water	Use Precision saw band; for thicknesses 1" and over use Claw Tooth.
Auto and Truck Tires	water	Use Precision saw band.
SAE (Carbon Steel) 1006, 1010, 1015, 1020, 1025, 1030.	Heavy cutting oil	10 drops per minute. Thicknesses under 1" may also be friction cut, in which case lubrication is not required.
SAE (Chromium-vanadium steel) 6130, 6135, 6140, 6150.	Heavy cutting oil	Thicknesses under 1" may be friction cut.
SAE (Stainless) 30-303	Coolant-Lubricant	Thicknesses under 1" may also be friction cut.
Ketos Steel	Heavy cutting oil	Thicknesses under 1" may also be friction cut.
Meehanite	None	Thicknesses under 1" may also be friction cut.

5407

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vent loading of saw bands in cutting certain aluminum alloys. They have been used most effectively for this purpose in conjunction with an atomized kerosene-type lubricant.

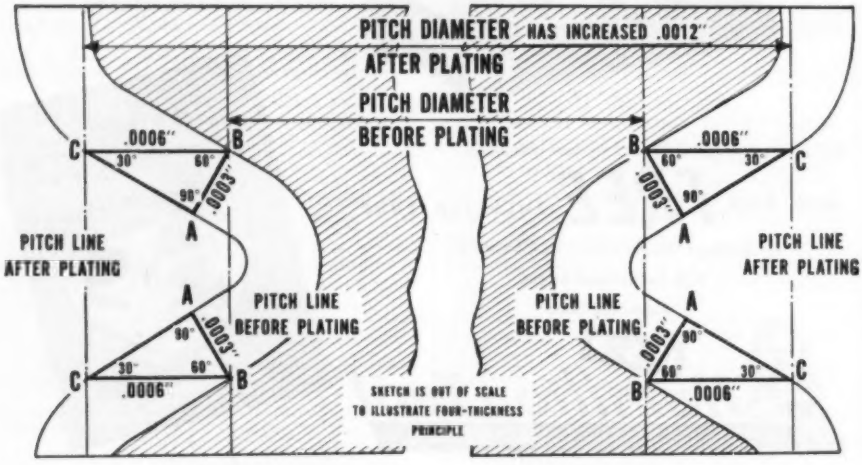
Fluid type coolants and lubricants can be applied in a stream or by dripping or spraying. Coolant is generally applied in a stream or by spraying since liberal quantities are usually required. Cutting oils are usually dripped on to the cutting edge of a band tool at a rate of from 6 to 40 drops per minute, depending upon the material being cut and the speed at which it is cut. DoAll drip and spray applicators are shown in the accompanying illustrations. In using coolants and lubricants it is important to get distribution right on the cutting edge of the band tool and the impinging area of the tooth face. The proper applicator should be selected to assure this.

Some lubricant and coolant recommendations for cutting specific materials are shown in the accompanying chart.

The End

One Plus One Equals Four

ONE of the seeming oddities when a screw thread is electroplated is that the pitch diameter (the outside diameter less a single depth of the thread) is increased four times the thickness of the metal plating. For instance, if you put .0003 of an inch of plating on a thread, that is, .0003 on one side of the diameter and .0003 on the other, the pitch diameter will be increased by .0012 of an inch. One and one seem to make four. Standard Pressed Steel Co., Jenkintown, Pa., put together this cross-sectional view of a thread—a view somewhat out of scale to illustrate the four-thickness principle. A plating thickness of .0003 of an inch increases the pitch diameter .0012, SPS points out, because—in the triangles ABC, the plating thickness of .0003 of an inch is represented by the line AB. Now, these triangles have angles of 30, 60 and 90 degrees and thus their hypotenuse is twice the base. Consequently, the line CB is twice AB, or .0006 of an inch. The increase CB occurs at both sides of the pitch diameter. Therefore, the growth in the pitch diameter is CB plus CB,



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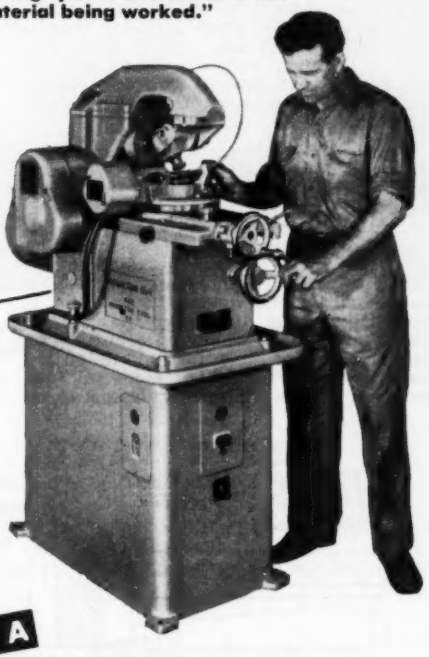

if you buy small quantities of precision gears, tell the man to "put your job on a Hamilton." You stand to profit two ways!

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or .0012 of an inch—four times the plating thickness! It is vital to make allowances for this in producing threaded fasteners so that after plating they will be exactly within tolerances. If the pitch diameter is too large, the screw won't go into a hole tapped to receive it. SPS said it prepared the sketch to show its customers—and its own management—that plating was not as simple as it appeared to be, that forming a thread before plating so that it would be precisely within tolerances after plating is more complicated than it might seem at first glance.

Lathe centrality testing device

The device illustrated has proved successful in high precision work. Instead of using a dial indicator to test the centrality of work mounted in the steady rest of an engine lathe, a micrometer spindle is used to compare the settings in four positions around the work piece. The sense of touch in setting the micrometer is generally more accurate than a dial indicator for this type of work. The dial indicator is not sufficiently reliable for such work because it will read slightly different upside down from when it is upright.

Another fault sometimes found in a device of this kind is the use of ball bearings on which the head or sleeve rotates on the stationary shank. Two sets of ball bearings should be used and a means of preloading them provided, one against the other. This must be done in order to eliminate any play, radial or axial, within the device itself. This is accomplished by threading the end of the central shank and using a nut to put pressure on the inner race of the outermost bearing. The outer races of both bearings are separated by a spacer or sleeve. Even if tightly adjusted the bearings will still rotate without difficulty and there will be no play. New high-quality ball bearings of either combination radial-thrust or plain radial type are preferred. It also would be desirable to make use of sealed-one-side bearing at the rear to exclude dirt from the assembly. The outer sleeve of this device is bored to a tight fit over the outer races of the ball bearing and it will then retain itself in this position.

It is also a good idea to harden and grind the complete central shank unit on all important surfaces.

This device can also be used to check the alignment of the hexagon turrets on turret lathes. In this case, hold the device in a sleeve mounted in the collet and rotate the micrometer head around a test bar fitted into one of the turret station holes. It is important to know that in testing alignment of a turret lathe in this manner, the job should be done after the lathe has been running long enough to bring the headstock bearings to normal operating temperature. This is important because it is a common practice by many manufacturers to build turret lathes with the center line

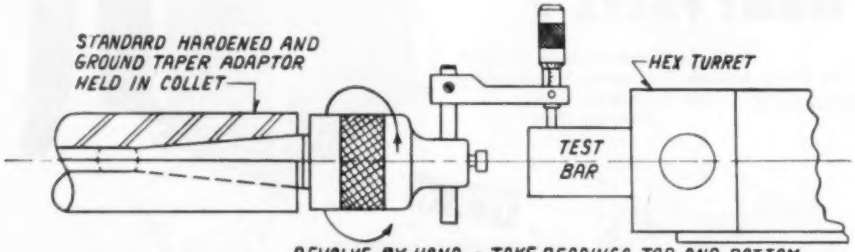
STANDARD HARDENED AND GROUND TAPER ADAPTOR HELD IN COLLET
HEX TURRET
TEST BAR
REVOLVE BY HAND - TAKE READINGS TOP AND BOTTOM AND ON EACH SIDE TO CHECK TURRET ALIGNMENT. SHANK OF DEVISE REMAINS STATIONARY

FIG. 1.

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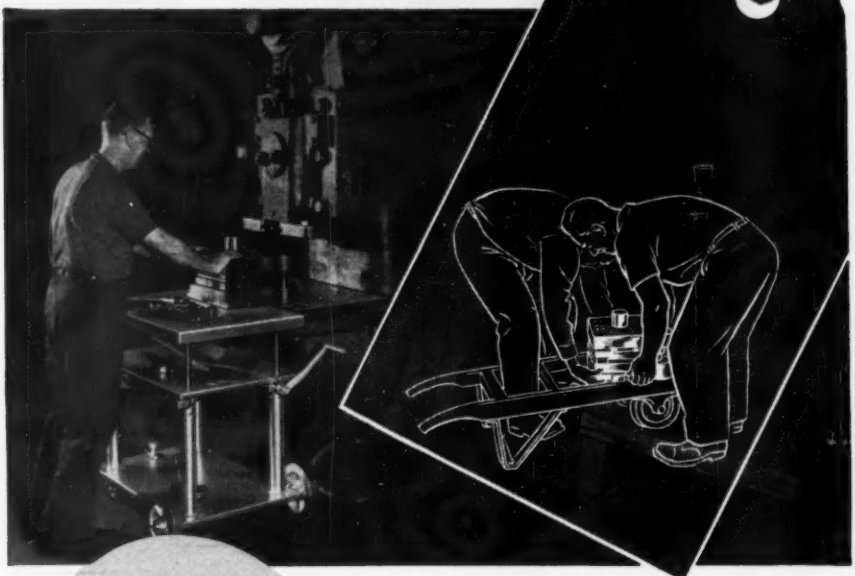

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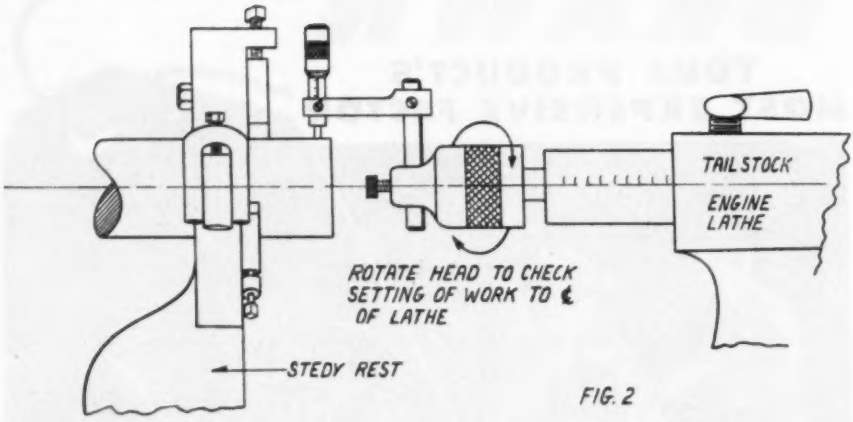


FIG. 2

of the head spindle as much as .005" lower than the center line of the holes in the hexagon turret. When the headstock is warm, enough expansion has taken place to raise the alignment to the same plane.

If preferred, a dial indicator may be readily used on this device by removing the horizontal bar which supports the micrometer and substituting a dial. A dial is sufficiently accurate for average work and may be slightly faster in its use.

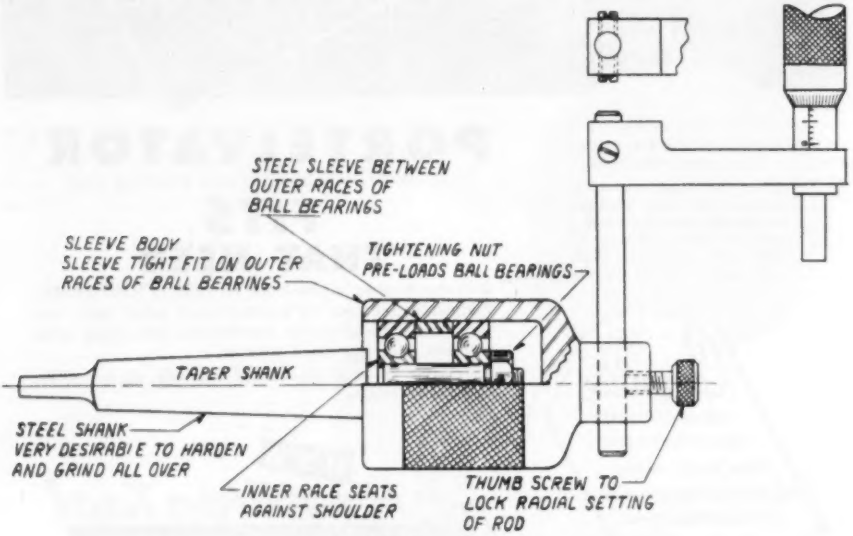
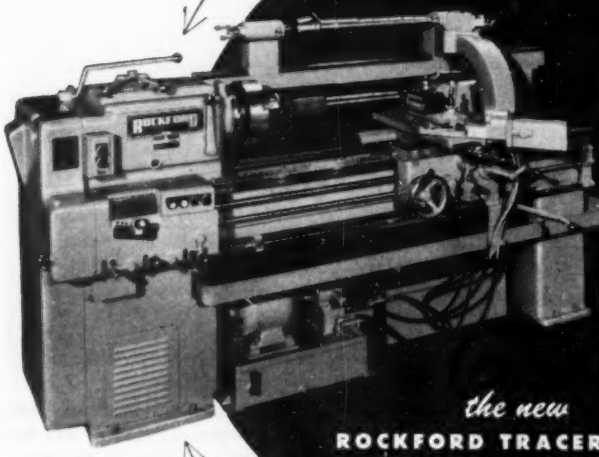

STEEL SLEEVE BETWEEN OUTER RACES OF BALL BEARINGS
SLEEVE BODY SLEEVE TIGHT FIT ON OUTER RACES OF BALL BEARINGS
TIGHTENING NUT PRE-LOADS BALL BEARINGS
TAPER SHANK
STEEL SHANK VERY DESIRABLE TO HARDEN AND GRIND ALL OVER
INNER RACE SEATS AGAINST SHOULDER
THUMB SCREW TO LOCK RADIAL SETTING OF ROD

FIG 3

ROCKFORD MEDIUM-SIZED ECONOMY-PRICED **DOES IT AGAIN!**



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Time Study . . . part 4
Incentive Systems Applied to Job Shop Operation

By **Harold R. Nissley,**
Professional Engineer
Cleveland Heights, Ohio

In answer to the question: Is there any incentive system that can be applied to job shop operations? the answer is, "Yes—not just one system but several kinds of systems depending on local conditions."

THE SUBJECT of this article was suggested by the question: "Is there any incentive system that can be applied to job shop operation?" There are, of course, several implications to this question: (1) Regardless of cost? (2) What is meant by job shop operation? (3) How well do you want the system to work? (4) What do you expect to get out of it? But before getting into these finer points let us review what systems are available for job shop operation—or any operation.

Current Incentive Systems

Scores of incentive systems have been tried within the last 50 years. Most of these have been disregarded for some reason or other. Some of these, which are no longer used, have greater merit than those in use today. But in order to keep this discussion within the limits of one article let us confine our attention to the half dozen systems that are in use today. Strangely enough, half of the extant systems are not based on time study or work measurement as we think of it. So we can classify the current systems under two main headings: (1) Simple non-timing systems. (2) Stop watch or predetermined time systems.

Simple Non-Timing Systems

Whenever anyone mentions incentive a stop watch image appears. There are, nevertheless, several systems that are not based on conventional time study or other work measurement techniques as we know them today. Among the more common are the old Halsey Plan; the tonnage plan; the dollar sales plan; the units-shipped plan; and the Ratio-Delay system.

Halsey Plan. This plan was developed by Frederick A. Halsey around 1890. Like some modern incentive plans the Halsey Plan is based on production records, not time studies. But unlike most modern plans the Halsey Plan did not give the operator a one-for-one

Ed. note. So keen has been the interest in the series of questions which accompanied the August and September articles that this article and others to follow will be devoted entirely to answering those questions which were asked most frequently. Very few questions were sent in which did not check number 1: Is there any incentive system that can be applied to job shop operations? Hence, the fourth article will deal solely with this particular question.

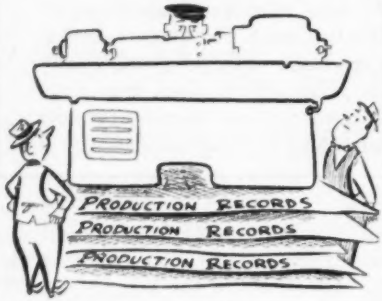
bonus when he passed the 100% mark (previous production rate). The operator shared whatever time savings he was able to effect with the company. Thus, if an operator saved three hours in a task that formerly took 10 hours, the operator would receive a one hour bonus bringing his earnings up to $1.65 to his $1.50 (the amount he received for 10 hours of work) he earned a 15 cent bonus gringing his earnings up to $1.65 a day. But he never slipped below his previous day rate of $1.50 regardless of how long it took him to complete the job ("So you have everything to gain and nothing to lose."—Management).

As production plateaus increased, management became more liberal with the bonus and the 50-50 plan soon became common. In this plan the operator receives credit for half the time he saves. In the above illustration he would receive a 22½ cent bonus instead of a 15 cent bonus. Generally the percentage of operator sharing increases after the plan is in effect and new factory bogies are established based on ne wproduction records.

Occasionally today, Halsey incentive plans give the operator ¾ of the time saved (and the company retains ¼). But today the most common ratio of Halsey incentive sharing is 50-50. The operator takes half the gain in time saved and the company takes half.

The reader may ask at this point: "How can you sell any plan to a union today that does not give all of the savings to the worker?" This is a good question. And the answer is simple: You can sell almost anything to the union today, if the end result is "in line." Obviously, if the 1/3, 50-50, or ¾ plan did not yield a take-home pay in line with the take home pay of others in the community doing similar work, then regardless of what you called the plan or how you figured it, you would have a difficult sales situation on your hand. But even a poor plan will have fairly easy going if the average pay envelope equals (or exceeds) the average in the community for similar work. So regardless of what plan you decide to use, gear the end results to com-

"Whenever anyone mentions incentive a stop watch image appears."



"The Halsey Plan is based on production records . . . not time studies."

munity averages—not slide rule calculations or handbook formulas.

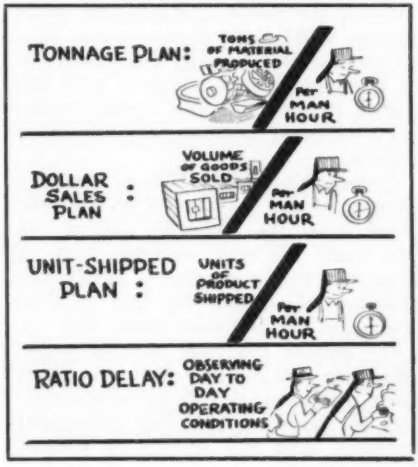
From the foregoing it is easy to see that the Halsey Plan without time study calculations minimizes the work in establishing standards and the time spent in selling standards based upon time study. But without the details usually found in the typical time study (e.g. elemental job breakdowns, etc.) it was difficult to base future job estimates on past performance—especially in job shop operation. Frequently, therefore, there is a wide gap between old jobs and new similar jobs. The ratio method of sharing, however, was supposed to take care of such differences; for example, if a new job was much easier to perform than an old job which appeared the same, the operator's earnings would be limited by the percentage of savings the plan called for; conversely, if the job was much harder, the operator still made his daily wage so he was not hurt.

In summary, it can be said the Halsey Plan has much to recommend it for small job shop operation—for shops under 300 which cannot justify a formal time study department. Certainly, the Halsey Plan should be considered by any daywork shop that is thinking about going to incentive. It is an excellent transition plan pending the establishment of a more formal plan based on detailed time studies.

Tonnage Plan: The tonnage plan, used by a few steel companies and foundries, is a plan based on tons of material produced per man-hour or 100 man-hours. Bogies (tons/man-hours) are established —usually on past production records. Workers are then told that they will share on a one-for-one basis for each percentage increase succeeding months or quarters show; thus a 10 per cent increase in the tons produced per man-hour would yield a 10 per cent bonus to each worker's pay.

Where business is seasonal then production figures are compared with like figures a year ago. Likewise, when weekly or monthly fluctuations are great, the time interval is increased to three months (or even a year).

Although the tonnage plan has much to commend itself (it is simple, easy to explain and to install and to keep up), it has certain drawbacks. What happens when a firm goes from small castings



with high individual value to large castings with small value per pound? Tonnage might go sky high as would tonnage per man-hour—without any more effort on the part of the work force than they were expending under the old day work plan. Like so many of these simple and "automatic" plans, the tonnage plan must contain fairly constant factors if it is to be fair and if it is to continue its incentive motivation.

Dollar Sales Plan. The dollar sales plan eliminates one of the main objections to the tonnage plan in that quotas are based on volume of goods sold (or shipped) per man-hour. These quotas based on previous sales volumes are established on a monthly or quarterly basis. Example: Suppose the sales volume (or goods shipped) per man-hour during the first quarter of 1954 was $5.00; then $5.00 becomes the factory bogies for the first quarter of 1955. But instead of producing at the rate of $5.00 per man-hour during the first quarter of 1955, suppose the work force averages $6.00 worth of goods sold (or shipped) during this period; then each one sharing in this incentive plan would receive a 20% bonus sometime after April 1.

Like the tonnage plan above, this plan, too, has much to offer the small company president who has neither the time, nor the money to set up a piece work plan based on time study or some other system of work measurement. But what happens when sales or shipments fall off? The operators who are left may be putting forth as much effort as they did when sales were increasing and bonuses were high. In short, many of the variables that affect sales or shipments are beyond the control of the operators and hence influence their bonus earnings somewhat out of proportion to individual and group effort. Moreover, like tonnage plans, there may be a tendency for certain individuals to 'let George do it." (i.e. coast while the others are working hard). However, proponents of such plans argue that loafers are not tolerated by groups working under good bonus plans because of the retarding effect such loafers have on the overall bonus.

Units-Shipped Plan. This plan gets away from some of the foregoing defects by basing quotas on units or products shipped per man-hour of work. Thus the number of units shipped per man hour for the first quarter of 1954 might be, say, 0.75; if this jumps to 1.00 during the first quarter of 1955, then all people in the bonus pool will receive a 33% bonus on top of their regular pay.

Such units need not be sold when they move out of production departments or out of shipping doors. They may go into storage pending customer orders.

Ratio Delay. Because of the stigma that has developed around the stop watch in certain companies (and for other reasons), a new system of work measurement has developed in recent years—the Ratio Delay System. Unlike the systems just described, the Ratio Delay System attempts to measure performance, but without any timing mechanisms.

Briefly, the system works something like this: A time study observer (without any timing devices) makes periodic visits (without warning) throughout a factory or a department several times a day or week. The observer will jot down the first job element he observes an operator performing on a job; if the operator is talking to a fellow worker and then starts to work when the observer aproaches, the notation in the observer's log book might be: "Chat with nearby operator." If the first impression of the observer is: "Pick up and insert new pieces into fixture—distance 20 feet," then this will be noted in the log.

After 100 to 1000 spot checks on an

operator's activity, a frequency pattern is developed. If a job has 10 elements and the first element was observed 50 times out of 1,000 observations, presumably this element constitutes 5 per cent of the cycle time.

The exponents of the Ratio Delay Plan argue the plan substitutes frequent spot checking over a long period of time for short stop watch time studies; hence the plan is more nearly representative of day-to-day operating conditions. They claim further that you do not need the same caliber of observer with the plan as you do with conventional stop watch time study. For these and other reasons they claim the plan is less expensive to administer.

The writer has not had any experience with the Ratio Delay Plan so he cannot appraise these claims. On the surface the plan looks good—good enough to try out on a limited basis in one department.

Incentive Systems Based on Formal Time Study

There is an old saying that you get pretty much what you pay for. Although the foregoing plans are simple and inexpensive to introduce and to administer, they have certain limitations. Chief among these limitations is their failure to reward **individual** effort. (the Halsey Plan excepted). And because they do not reward **individual** effort they seldom yield as much product per man-hour as do other plans based on individual effort compared with group effort.

So, for maximum results, most companies have ultimately gone to some system based upon detailed measurement of job content.[1] Among the common incentive systems based on time measurements are: (1) Straight piece work (one-for-one); and (2) Emerson Efficiency Plan.

Formal Time Study

Straight Piece Work: Straight piece work (or commonly, "piece work") is the plan of rewarding individuals on the basis of pieces produced after standards or quotas have been set (by time study or some other formal system). Thus, if the daywork rate on a particular job is $1.50 an hour and management has decided to build a 33% incentive into a piece work structure, then normal operators working under piece work conditions will average $2.00 an hour. If a "high task" standard is set at 100 units an hour, a fair piece work rate of 2c is applied.

But what happens when an operator

[1]The writer recalls one incident during World War II where an old arms manufacturer decided to put everyone on piece work when government contracts started coming in calling for millions of units. This manufacturer did not have time to time study his operations (so he said); so he based his operator quotas on past production records (after upping these figures from 10% to 30%). Despite the initial outcry, "We can't make any bonus around here," this manufacturer found his women operators who were supposed to be averaging $1.50 an hour were actually earning $4.50 an hour and taking home (with over-time) from $8,000 to $11,000 a year—compared with the frozen wages of their supervisors of $4,500! It is the only time the writer can recall where the War Labor Board ordered thrown out an incentive plan that favored the workers.

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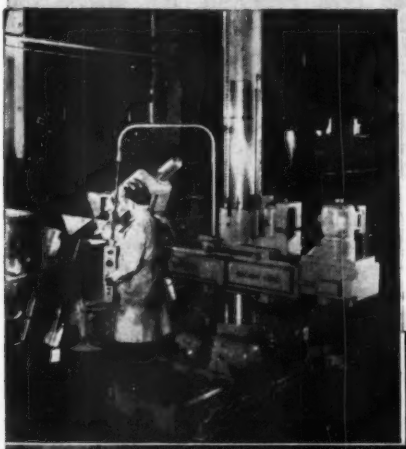

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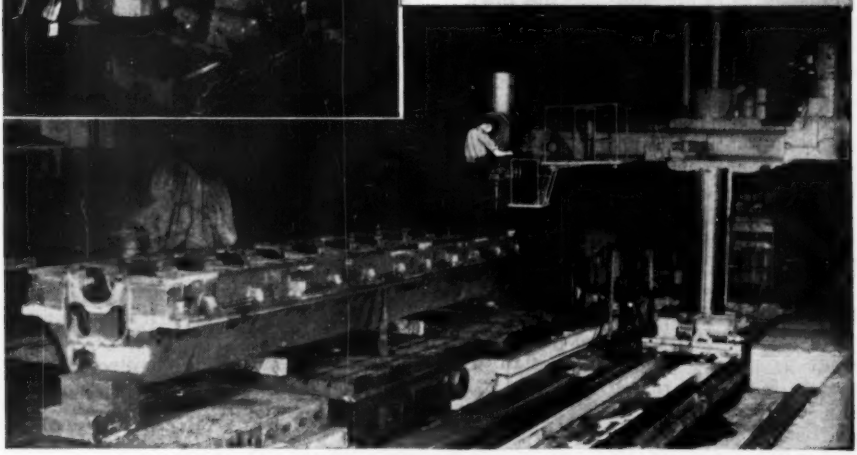

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Piece Work

turns out less than 75 units—the number necessary for him to earn his daywork rate? Some companies will pay such an operator less than the $1.50 daywork rate—say $1.25 an hour—on the theory that such a man should not be encouraged to loaf (even at ¾ his anticipated earnings rate). Many companies, however, will guarantee an operator his daywork rate especially when the differential is as great as it is in this case (33%); as these differentials decrease, however, there is a greater tendency to maintain a significant incentive spread by lowering the guaranteed "floor."

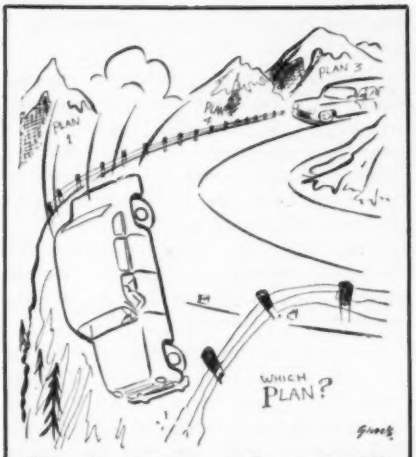
Of the many incentive plans in use today, the straight piece rate is the most common. When the tests of a good wage payment plan are applied to this system it is easy to see why this plan has such widespread use: It is simple and easily understood by everyone. It is not difficult to administer (compared with other incentive plans based on individual effort). It pays in direct ratio to an operator's effort (instead of in regressive ratio as do some other plans). It is accepted by more unions than any other plan.

Emerson Efficiency Plan: Most incentive plans do not become operative until after a certain standard of performance has been reached. But Harrington Emerson, a consultant for the Santa Fe Railroad at the turn of the century, tried to overcome the shortcomings of conventional piece work and other types of incentives by starting his premium pay at 67% of efficiency instead of 100%. Emerson developed a scale of efficiencies ranging from 67% to 100%. At the 67% point the bonus was very little (only 0.0001%). But as operator efficiency increased the bonus percentage increased; thus at 100% efficiency the operator earned a bonus of 0.20% (and after 100%, 1% for each percentage increase in efficiency).

In addition to encouraging beginners by rewarding them below 100%, Emerson claimed another advantage for his plan: His efficiencies were figured over two and four week periods of time, thus averaging out day-to-day irregularities.

Although the Emerson Plan has much to commend itself to the small job shop the plan is in little use today.[2] There are, perhaps, several reasons for this small interest: (1) Very few operating men are familiar with the plan (although most consulting engineers know about it). (2) There is some paper work involved in calculating individual efficiencies over pay periods (but very little more than is involved in conven-

[2]A modified Emerson Plan recently came within the writer's experience. The plan started to pay bonus at 67% (as with the Emerson) and increased in **equal** percentage increments up to (and beyond) 133% at which point full expected bonus earnings were achieved. But at 100% the plan paid 21%; thus the operator only earned a 12 per cent bonus for increasing his output 33% above 100% efficiency. In other words, the Plan paid liberally for beginners and marginal producers but penalized operators whose efficiency ranged between 100% and 133% (beyond 133% the Plan followed the conventional piece work pattern).



"Like the answer to the automobile question the answer depends largely on the skill of the driver."

tional piece work). (3) Unions are skeptical of any plans not based, throughout, on a one-for-one system; although the Emerson Plan pays liberally below 100% (compared with no premium pay under 100% in other plans), the progressive nature of the plan diminishes above 100%.

Which Plan is Best for Job Shop Operations

The answer to this question is akin to the answer to the common question, "Which automobile is best?" Like the answer to the automobile question the answer depends largely on the skill of the driver. In other words, no incentive system is ever any better than the caliber of supervision and engineering talent administering it. The writer has seen ordinary day work yield higher production results than carefully devised incentive plans;[3] indeed, there is frequently the tendency for supervisors to relax their vigilance after a new incentive plan has been adopted—"Our production troubles are over now, the incentive will automatically turn out production." Because the basic production trouble of many shops is supervision and/or time study talent and/or top management, it is difficult to see how a good incentive plan will work unless simultaneous remedial training is given or action is taken within the personnel areas just mentioned.

But this seems to be begging the question, "Which plan is the best for job shop operation?" As indicated at the beginning of this article we will have to define some of these terms and show how under one set of conditions one plan is better than the others. But at this point we can make a blanket (and somewhat startling) statement: **All wage payment plans tend to wear out.** The optimum life for most such plans seems to be 5 years; after 5 years management and the union usually find they are spending more time in trying to iron out differences than the plan is worth. As a starting point in any plan, the writer strongly urges any company contemplating a change in its wage system to put a five year limit on the plan; and if the change is very radial, a one year trial period might be established when the plan is put into effect.

For the small shop (employing under 200) which cannot justify good time study talent, the Halsey Plan, the Tonnage Plan, or the Units-Shipped Plan, are all good possibilities. Indeed these plans could be used for nearly any sized shop when going from straight day work to some kind of incentive; in other words these are good "transition" plans —plans that can be used during the period when a company is setting up (or thinking about) a more formal type

[3]For a fuller discussion of the possibilities of day work operation see the writer's artfele, "Improving Labor Efficiency in Daywork Factories," **Mechanical Engineering, July, 1947.**

of incentive program based on time study or some system of predetermined time values.

But any size of job shop should attempt to set up standard data on its operations (a) for piece work possibilities and (b) for estimating. Such standard data development can be achieved by hiring a full-time (or part-time) industrial engineer (or engaging consulting engineering talent on a part-time basis).

Like the purchase of an automobile, don't buy the first system that some consultant or local engineer proposes. Get a few books from the library and read up on these systems yourself.[4]

Conclusions

A sound incentive system can help to increase job shop production from 10% to 50%. But incentive systems, like automobiles, wear out—the optimum life for most incentive systems is 5 years.

No incentive system will ever take the place of good supervision. One firm (employing 22,000 people) terminated a long time incentive system in 1946 and returned to day work operation where they have been able to maintain an 85 per cent efficiency level; this high efficiency for day work operation for the past 8 years is only possible through diligent day-to-day supervisory and top management leadership.

If you have a union shop, you would do well by discussing some of your plans during their formative stages with the union officers. Otherwise you may find yourself with the best plan ever developed—and "no place to go."

The End

[4]One of the most comprehensive books yet written on wage incentives is WAGE INCENTIVE METHODS by Charles W. Lytle (Columbia University); published by The Ronald Press Company, New York. Condensations of most of the plans now in use may also be found in INDUSTRIAL MANAGEMENT by Spriegel and Lansburgh, Published by John Wiley & Sons, New York.

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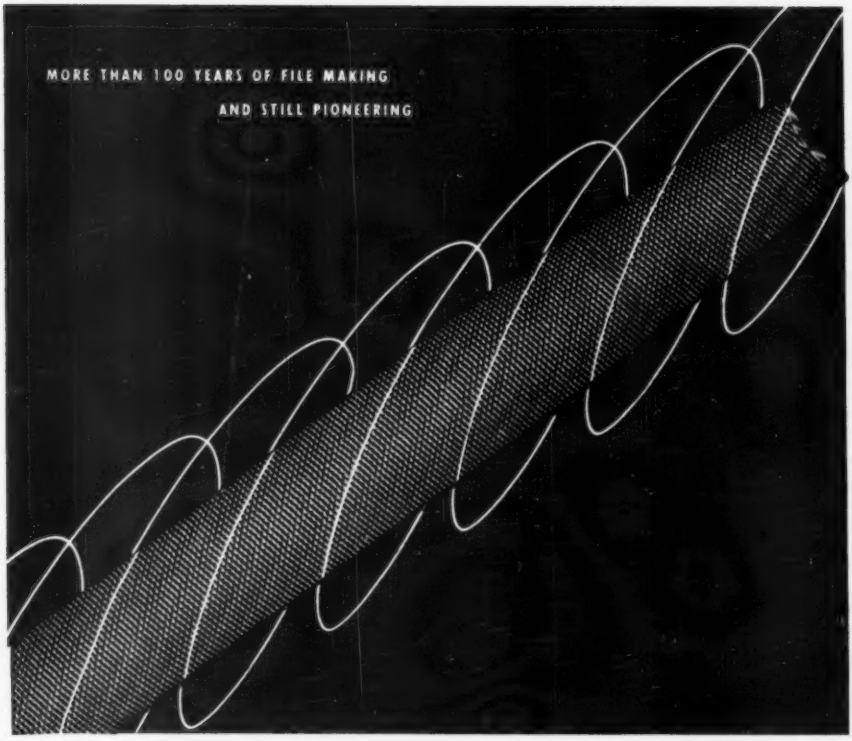

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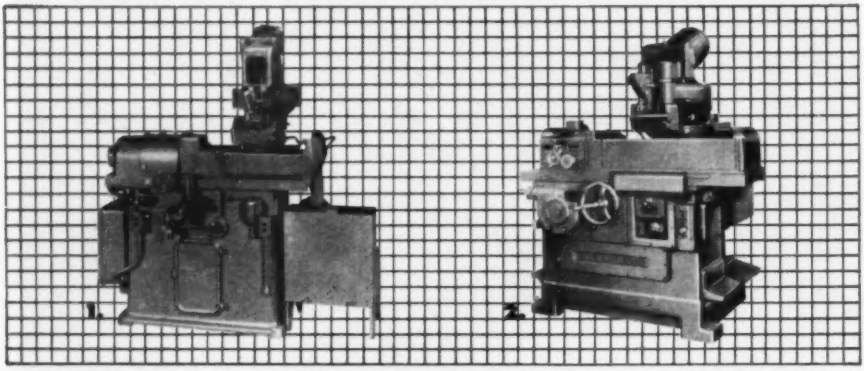

Barber-Colman Sharpening Applicable to All Hobs and Form-Relieved Cutters

Sharpening is the one element of hob accuracy which the user must maintain. For high production sharpening or for small, job-lot sharpening, the most economical and most accurate method is the Barber-Colman method. Three machines cover the size range of your work and the price range for your specific requirements. One of these three automatic machines, the No. 4-4, No. 6-5 or No. 10-12, will do your job cheaper, faster and more accurately than can be done by any other method.

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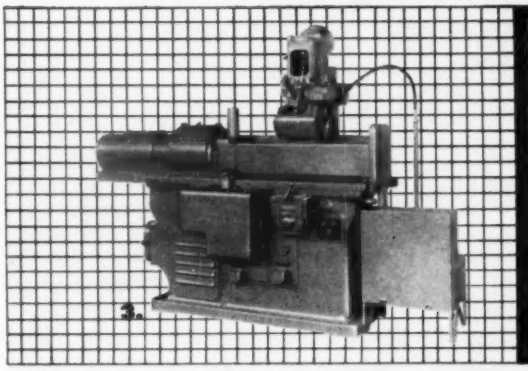
Positive mechanical control over all sharpening factors takes the human element out of resharpening hobs and formed cutters. It is the efficient way to sharpen these tools because it puts sharpening on a production basis and automatically produces uniformity, reduces sharpening time, and saves the operator's time for other duties. Spacing, lead of gash and radialism are held within the tolerances for any accuracy classification, including Class AA. Any hob or formed cutter can be sharpened on one of these automatic sharpening machines.

All Barber-Colman hobs and form-relieved cutters are sharpened on these machines. Because of their accuracy and ease of operation, these machines are also used by most competitive hob manufacturers for sharpening their hobs. Tolerances for the specific class of hob are easily held, and one operator can operate several machines. Once the necessary set-up is made, sharpening proceeds automatically without further attention from the operator.

TO MAINTAIN HOBS AND PROLONG CUTTING LIFE



1. No. 4-4 Automatic Sharpening Machine. High Production, Fixed Stroke. Work 4" Diameter, 4" Length. Wet Grinding Optional (Shown).

2. No. 6-5 Automatic Sharpening Machine. Adjustable Table Stroke for Maximum Production. Wet Grinding Standard. Work 6" Diameter, 5" Length.

3. No. 10-12 Automatic Sharpening Machine. Adjustable Table Stroke for Maximum Production. Large Work up to 10" Diameter, 12" Length. Wet Grinding Optional.

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With costs a vital factor in maintaining competitive position, many new features and improvements in Barber-Colman Automatic Sharpening machines will help you place man-hours and tool costs on a competitive basis.

Wet grinding is an ideal arrangement for sharpening carbide tools, and also permits higher sharpening feeds on high-speed steel tools. It is optional on No. 4-4 and No. 10-12 machines, but is standard equipment on the No. 6-5 Sharpener.

Adjustable stroke increases convenience and sharpening speed. This is a standard feature on both the No. 6-5 and No. 10-12 machines. New wheel spindle, work spindle and tail center designs have been incorporated in all machines for increased accuracy, convenience and output.

Check these new features for sharpening efficiency on your production operations and cost-reduction in tool programs. For full details on the complete line of Automatic Sharpening Machines, see your Barber-Colman representative or write direct to Automatic Hob Sharpening.

Complete data on cause and effect of hob sharpening errors, as well as detection and correction of such errors is contained in this recent issue of Hobbing Notes. Write for Vol. XI, No. 1 on your company letterhead and we will mail you a copy promptly.

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HOBS AND MACHINES SINCE 1911

A Method of Dimpling Titanium

By **Frank Charity**

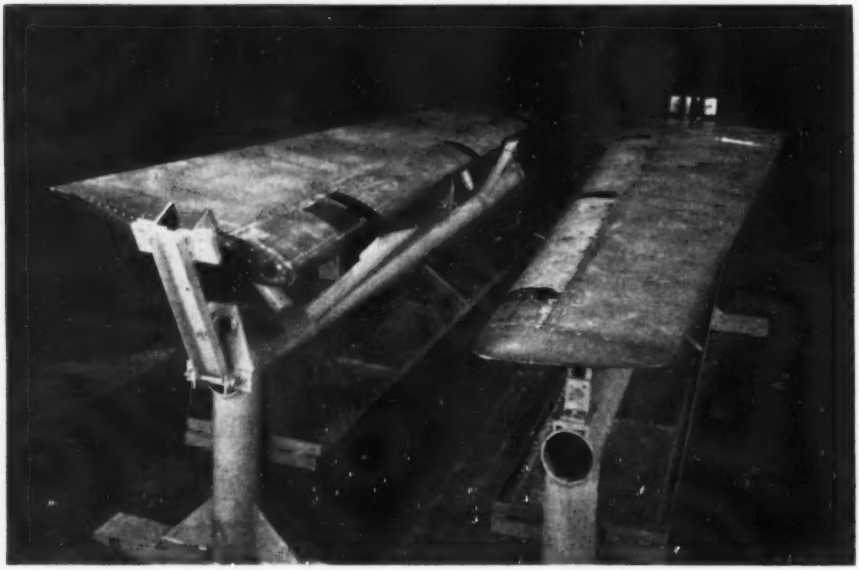
A SATISFACTORY method of dimpling titanium sheet stock with both stationary and portable squeezers has been developed by Aircraft Tools, Inc., Los Angeles.

It involves the use of dies with integral resistance-type heating elements, which prevent critical fracture strains by elevating the temperatures of areas to be dimpled to 600° or 700° F.

Experience has shown that adequate dimples can be formed at lower temperatures, but the latter aren't considered practical just now due to inconsistencies in the various types of titanium sheet stock which are now commercially available.

Aside from the fact that their design includes a generous allowance for springback (especially so in work with

Sheet stock is dimpled to permit use of flush rivets or screws where perfectly smooth, streamlined surfaces are required, as on these air-foil surface.



Portable squeezers have been satisfactorily used to dimple titanium sheets with thicknesses up to 0.064" thick, as indicated here.

heavy-gauge materials), the dies are comparable to the tools used in dimpling 75ST aluminum and magnesium sheet stock. They are heated with a common control unit in each circumstance in order to obtain forming temperatures of maximum uniformity.

Flush rivet and screw applications commonly involving the dimpling of sheet stock in aircraft work are as follows:

Application	Pilot Hole
3/32 dia. Rivet	No. 40
1/8 dia. Rivet	No. 30
3/16 dia. Rivet	No. 10
1/4 dia. Rivet	1/4
8-32 Screw	No. 36
10-32 Screw	No. 30

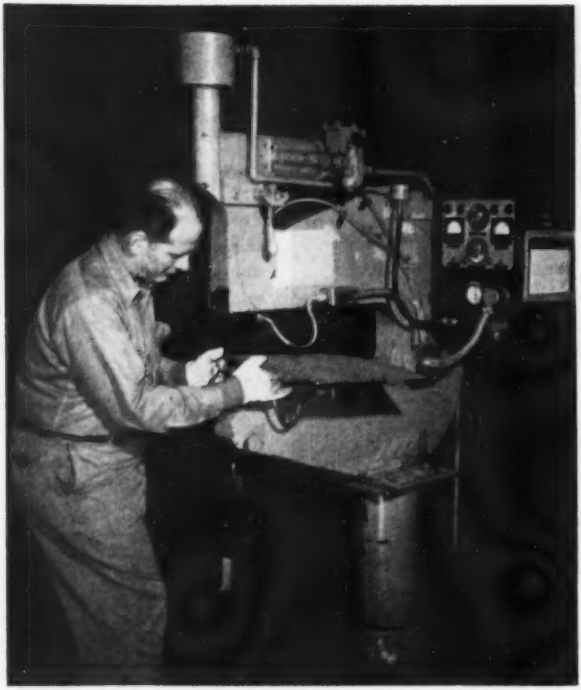
Dimples for the above applications have been formed in 0.016", 0.025", 0.040", 0.064", and 0.081" gauges of titanium. However, where portable squeezers were employed, consistently good results were obtained only where the stock was not more than 0.064" thick. The maximum fastener size for this gauge of titanium is a 3/16"-dia rivet.

Metallographic examinations of mounted cross-sections of the dimples have disclosed generally good grain flow with no evidence of circumferential or transverse cracking. Slight inclusions and voids were found both inside and outside of dimpled areas in a few specimens, but these had no apparent effect on the formability of the material and in all probability did not impair the strength of the dimple in any event.

Due to the aforementioned material inconsistencies, dwell pressure and die temperature are predetermined by test prior to each production run. Dwell time is subsequently computed by means of an oscillograph or pull test.

Rivet holes are not deburred prior to hot dimpling. However, titanium materials are usually cleaned more carefully than other materials in order to eliminate the possibility of surface contamination at elevated temperatures.

Holes in two or more titanium parts have been simultaneously dimpled



Stationary squeezers equipped with heated dies can be used to dimple virtually all commercially available grades of titanium sheet stock.

where perfect nesting was required, and good results were obtained where the gap between faying surfaces was less than 5% of the thinner sheet.

The dimensions of titanium dimples are such that a rivet head will protrude 0.002" to 0.004" before it is driven in any given circumstance. This enables the rivet to produce a snug joint by drawing the sheet stock as it is driven.

As a rule, it is desirable to heat titanium rivets to about the same temperatures that are used in dimpling either before or during riveting operations.

The End

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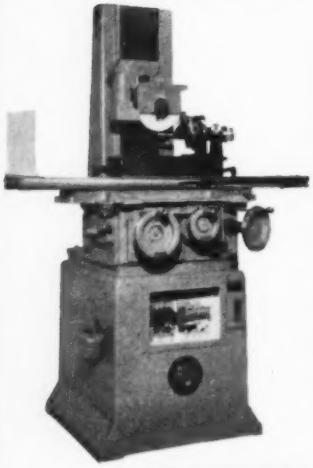

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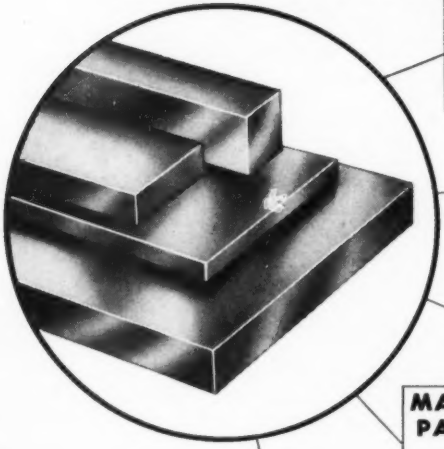
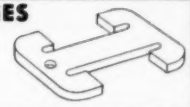


TEMPLATES

GAUGES



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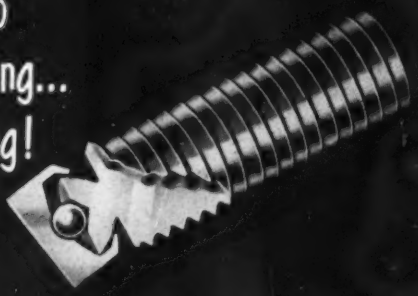

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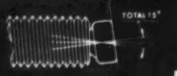
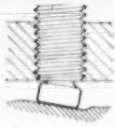
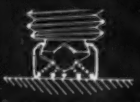


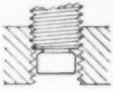
Ball-bearing construction insures frictionless, automatic angle adjustment and rotation; pad swivels freely in *all* directions up to 7½° from the centerline!



Pad seats firmly on work surface within angular range!



Force distributed equally to pad face. Conical seat distributes force equally in all directions; insures easy alignment in angular applications; greater freedom of motion.



Pad inserts from top of threaded hole or from bottom for easy installation!

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Multi-Spindle Drilling of Radial Holes

By **Clifford T. Bower,**
Consulting Tool Engineer

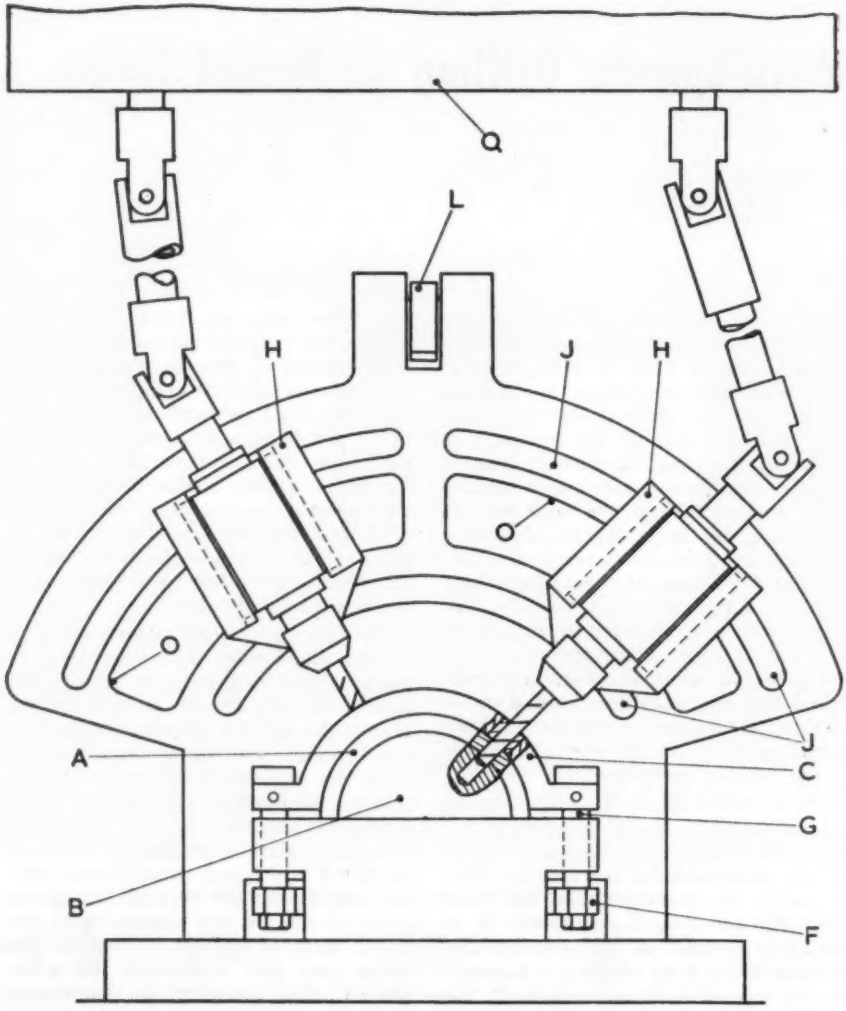
ONE form of commercial engineering product incorporates in its construction strips of metal bent to semi-circular form in which two holes are drilled radially so that their center lines intersect the origin of the semi-circle radius. In the range of products manufactured, the components are of similar shape and made from the same section of rectangular strip; the variable factors in the component range are the angular disposition of the drilled holes and the radius of the semi-circle. The components are produced in very large lots, but by keeping the operation time per piece as short as possible it was found that the quantities needed could be produced on one drilling setup which would cater to all the variable factors in the various components.

Three views of the finally designed jig are shown in the illustration which has been simplified by omission of one or two constructional features in order to clarify the description. In the front view the arc-shaped component **A** is shown in position on the semi-circular locating block **B** on which it is clamped by the curved drill guide plate **C**; the clamping action is obtained by a downward pull. The angular positions of the two drilled holes are finally maintained by the use of hardened guide bushings incorporated in the arc-shaped plate. The various sizes of components with their varying hole positions are catered to by providing a drill guide plate for each one. Also, the varying radii of curvature in the components are accommodated by provision of a series of interchangeable locating blocks **B**. Apart from the guide plates and locating blocks, no other detachable parts are needed by the jig.

The aforementioned downward pull on the guide plate for clamping purposes is provided by a small double-acting air cylinder **D**, located at the rear of the jig. The cylinder stands on a small bridge with its plunger pushing vertically downward for clamping; the plunger depressing the pivoted plate **E** which is hinged at one end. The other end of the plate terminates in a pair of tongues **F** which pass through rectangular openings in the vertical foundation plate of the jig and engage with the lower ends of the guide pins **G**; the guide pins pull downward the guide plate **C**, thus clamping the component. Vertical movement of the guide plate is small so air ejection for the component

is provided. Apart from speed of operation the air ejection feature has the effect of keeping the work location clear of swarf. The air ejection gear has been omitted from the drawing given here.

From the front view of the jig it will be seen that the two drills are mounted in a pair of short spindles with simple collet gripping arrangements provided. The spindles are housed in blocks which slide in the stationary guides **H**; the guides are of simple T-section and each



FRONT VIEW

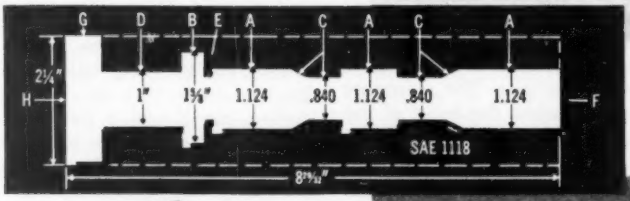
This is the difference High Velocity Turning makes

this job took...

11.50 min.

FLOOR TO FLOOR

A. Turn — 694 RPM — .015" Feed
B. Turn — 489 RPM — .015" Feed
C. } Form — 119 RPM — .0025" Feed
D. }
E. Face, shoulder, neck, undercut, HSS
F. Face 243 RPM — .0035" Feed
G. Knurl
H. Cut off — 243 RPM — .0035" Feed



this same job takes...

5.00 min.

FLOOR TO FLOOR

A. Turn — 1000 RPM — .022" Feed
B. Turn — 1000 RPM — .022" Feed
C. } Form — 340 RPM — .0035" Feed
D. }
E. Face, shoulder, neck, undercut
F. Face 489 RPM — .0035" Feed
G. Knurl
H. Cut off — 489 RPM — .0035" Feed

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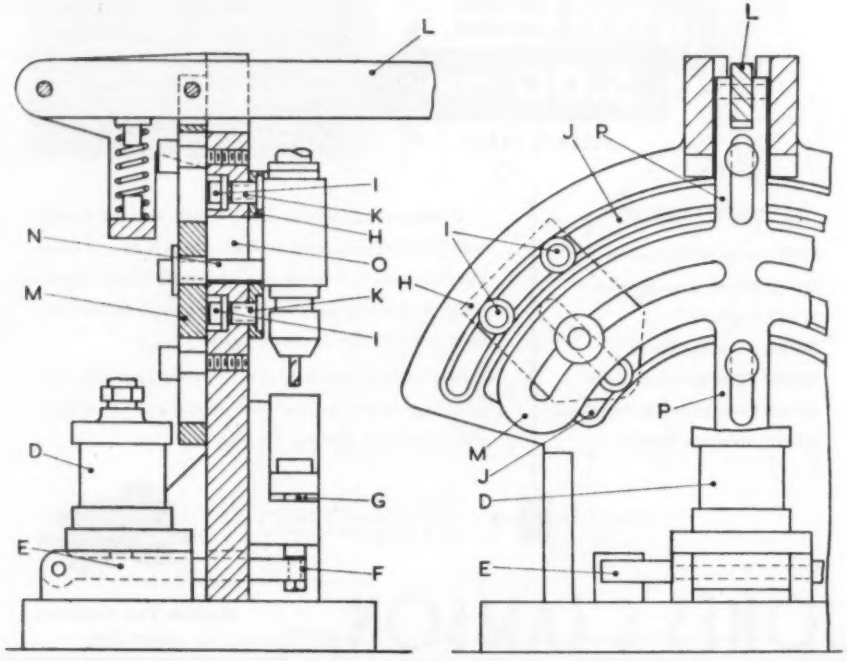
one is secured to the vertical plate of the jig by means of three bolts **I**.

Referring to the sectional side view and the front view, the method of radially setting the angular positions of the two drill spindles is by unclamping the bolts **I** and sliding the guides **H** on an arcuate path which is dictated by the two arcuate slots **J** machined through the vertical foundation plate. Slots **J** are T-shaped and the narrower portions are a close fit on the hollow studs **K** incorporated in the back of the guides **H** and ensure that the drill spindles are in a truly radial position in relation to the work at all settings. The clamping bolts **I** are sunk below the back of the plate so that a surface clear of projections is obtained.

Axial feeding of the drill spindles on their angular path is by hand operation of the single lever **L** which is pulled downward by the operator. The lever is pivoted on a pair of plates projecting to the rear of the jig and is returned to its uppermost position automatically by the action of the compression spring shown in the sectional side view. The lower end of this spring is supported by a short bridge piece attached to the lower ends of a pair of downward projecting tongues.

The feed lever moves vertically the plate **M** which is the means used for traversing the drill spindles. From the back of each drill spindle housing projects a pin **N** which passes horizontally through an elongated slot machined in each spindle guide. The pin passes also through the vertical foundation plate



SECTIONED SIDE VIEW

BACK VIEW

of the jig which has wide arcuate slots **O** machined therein. The large size of these openings is necessitated by the axial feed of the drill spindles, and therefore, the travel of the pins **N** and of the arcuate adjustment of the drill spindles.

The rearward projecting portion of each of the pins **N** carries a small roller which engages with an arcuate slot machined in the feed plate **M**; vertical movement of the feed plate under the action of the feed lever causes axial movement of each drilling spindle. The rollers on the ends of the pins attached to the drilling spindle housings can roll in the arcuate slots in the feed plate when this is fed vertically downward.

Guidance of the feed plate in a truly vertical path is by means of the lugs **P** (Back View) which have elongated slots therein to act as guides. The feed plate is held in contact with the rear face of the vertical foundation plate by means of the headed guide screws which have a plain portion under their heads for engagement with the slots in the lugs **P.**

For driving the drilling spindles, a two spindle drill head **Q** is attached to the spindle of a standard pillar type drill press. The drill head unit is specially constructed to suit the jig and its output spindles carry standard universal joints. Another pair of universal joints are fitted to the actual drilling spindles on the jig, so that a positive driving connection is maintained between the drill head and the spindles. The universal joints accommodate the driving requirements of the radially disposed drilling spindles in any of their positions. The nearer that the drilling spindles approach to the truly vertical, the shorter will be the distance between the upper and lower universal joints. To cater to these variations in the length of the driving connections, the upper universal joints have long hollow guides attached to them while the lower joints have male shanks which can slide in the guides. A driving connection is maintained between these two sliding members by means of a key and long keyway in each.

This particular drill jig, with hand feeding and air clamping and ejection, can maintain an output of 200 drilled pieces per hour. The drills are 3/16 in. diameter and the work pieces are 3/16 in. thick.

The use of universal joint drives from specially designed gear boxes or standard multi-drill heads attached to standard drilling machine spindles enables several angular holes to be drilled at one stroke of the feed handle. The alternative to this is to provide two-position drilling jigs in which one hole is drilled at a time. Universal joints used in the manner illustrated can be used to operate auxiliary equipment built into the jig so that a fully automatic cycle of drilling, work loading and clamping, and drill feeding can be initiated. For instance, by altering the jig shown, a cam driven by a third universal jointed shaft could be made to actuate the feed handle. Similar duties for very high speed shafts can be performed by flexible driving equipment.

The End.

"This is the man you'll replace, Morris."

Cutting Forces: Their Effects on Milling Operations and Milling Cutter Selection

By **Horace A. Frommelt,** Consulting Engineer

THE HORSE POWER in the driving motor of a machine tool such as a milling machine appears at the cutting edges of the milling cutter as foot pounds per minute. The larger the surface foot rate (the feet per minute at which the cutter is revolving), figure 1, the smaller will be the force developed between the cutting elements and the metal that is being removed from the workpiece.

To review our previous discussion: assume we have available a 25 hp milling machine for the job in hand; also, that the cutter is equipped with carbide blades and that the operation in hand justifies 500 sfm. We now have 25 hp delivered to this cutter which means that 825,000 ft. lbs./min are available for work at the edges of the carbide tips or blades. (25 hp x 500 sfm=825,000 ft. lbs.) If the sfm is 500, then the pounds of pressure developed between the cutting elements and the workpiece will be 1,650 pounds. (825,000 ft. lbs. divided by 500=1,650 lbs.)

Note what happens if we change the sfm up or down. If the cutter can be run at 10,000 surface feet per minute the pressure developed between the blades and the workpiece is reduced to 825 pounds, or exactly one-half of the pounds of force generated at a surface foot rate of 500. But note also that the cutting pressures jump to 8,250 pounds if the surface foot rate must be lowered to 100 feet per minute. This latter speed of the cutter would be called for if high speed steel blades were used in the milling cutter. In other words, it is possible to go from 825 pounds of pressure to 8,250 pounds, if the surface foot rate is varied between 100 sfm and 1000 sfm.* Yet the same 25 hp milling machine is being used. In the examples just mentioned it is assumed that the full 25 hp is being used for the various operations, regardless of the type of cutter or kind of cutting material specified.

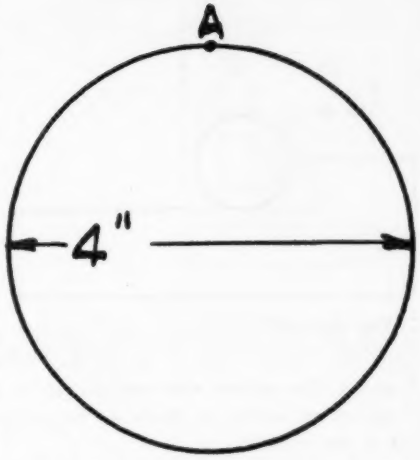
Before proceeding with the discussion of cutting forces as developed in mill-

*For a detailed discussion of sfm rates in milling, see MACHINE and TOOL BLUE BOOK, September, 1953. It contains a splendid article on "How to Select the Proper SFM in Milling Operations," by Horace A. Frommelt.

ing technique it may be profitable to consider this relationship between the force and the rate at which it is being applied, and its effect upon machines and machining. It is commonly understood and accepted that a 25 hp electric motor with a top speed of 36000 rpm is considerably smaller than a 25 hp motor of the same specification but whose top rpm is 1800. The lower the rpm rate at which the motor does its work the larger it must be because the forces that go to make up the 25 hp are proportionately greater. Conversely, the higher the rate of speed at which the motor delivers its work the smaller the forces and consequently the smaller the physical dimensions the motor can be. This is well recognized and accepted. Yet, it is not at all uncommon to have this proposition questioned regarding the cutting forces developed in machining and their relationship to the speed at which they are delivered, when laid down as they have been stated here. And yet it is easily proven and quickly calculated. If the rate at which the working forces are applied is changed, the forces themselves must change inversely. The higher the rate, the lower the forces, and the lower the rate, the higher the forces.

Selection of Milling Cutters

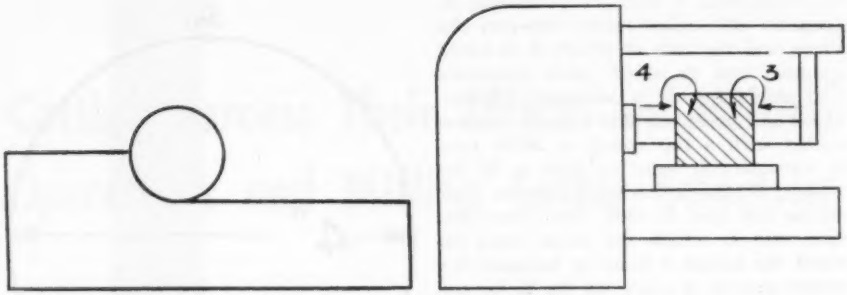
With this fundamental clearly in mind its effect on various aspects of milling can be satisfactorily discussed. For example, consider the effect of these forces



1. Point "A" travels 12" or 1 foot when the 4" diameter cutter makes 1 revolution. Hence if the rpm is 500, then the sfm (surface feet per minute) is 500, or "A" travels 500 feet in one minute.

on the choice of a milling cutter. The rate at which the milling cutter can be operated becomes of vital importance to the entire operation. If a particular cutter design makes possible moving metal at 1000 sfm rather than 500, in effect the capacity of the machine tool has been doubled. Not only have we increased the rate at which the work has been done but these forces have made their effects felt even back to the

Choice of a milling cutter should be made on the basis of the surface foot rate at which it can be operated. The higher the sfm, along with equal or good blade life, the greater will be the output of work. The smaller the cutting forces, the less effect upon the machine tool, its maintenance, its repairs. At the same time, the effect of each dollar of capital invested has been doubled. Floor space of the machine has doubled in value. All this is because the cutting forces have been decreased by choosing a cutter which enables you to specify and increase the surface foot rates.



2. The slab mill is the most economical to use if the flat surface of a component is to be milled so as to end in a radius specified as the radius of the slab mill.

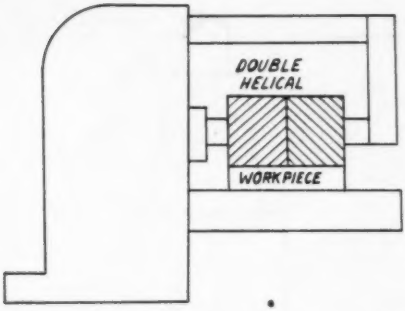
3 and 4. The helical slab mill should be set up on the arbor as shown in figure 3. If set up as shown in figure 4, the cutting forces would tend to force the slab mill out of the spindle.

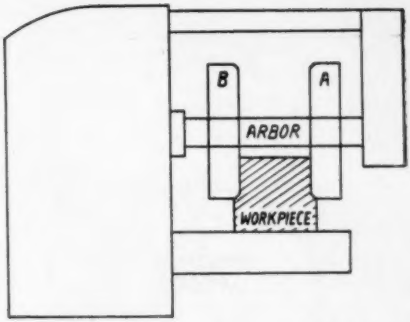
initial investment. Assume that our 25 hp milling machine is being operated with a milling cutter that permits specifying 1,000 sfm instead of 500. A component that calls for a 4" diameter cutter is being milled on a vertical miller. Since the circumference of this cutter is approximately 12" or 1' then to arrive at 1,000 surface feet it will be necessary to operate the cutter at 1,000 revolutions per minute. Further, if the 4" diameter cutter has 10 teeth and the specified tooth load or chip thickness is .005" then the feed per revolution is .005" times 10 or .050". Therefore, in 1,000 revolutions the feed rate will be 50 rpm.

If the same operation is performed with a 4" diameter cutter at a surface foot rate which, for any reason whatsoever, must be reduced to 500 feet per minute then the rpm of the spindle is lowered to 500 and the feed rate, or the rate at which the workpiece is moved into the cutter, is reduced to 25" per minute. The rate at which work is being turned out, at least so far as the cutter phase is concerned, has been reduced exactly by one-half or the output has been cut by 50%.

The choice of a 1000 sfm cutter has doubled the capacity of the machine as compared with the 500 sfm cutter. This increase in the sfm is based primarily on the cutting forces as it affects certain grades of carbide and certain types of cutter design. Hence, a cutter design permitting 1000 instead of 500 sfm, makes a machine tool costing $25,000.00 the equivalent of 2 machines of the same price. The effect, therefore, of reduction in cutting forces may, if applied to a choice of cutter, reach back to influence the value of the original capital investment. Other effects immediately follow: since the cutting forces have been reduced their effects on vital machine parts such as bearings, gear trains, clutches and so forth are also reduced; maintenance should also be of less annoyance and less of a cost item. This is assuming that the increase of spindle speed is well within the range designed into the machine.

To summarize, the choice of a milling cutter should be made, in the first instance, on the basis of the surface foot rate at which it can be operated. The





5. Preferred method of using helical slabs. If two are set on the arbor with the helical angles opposed the horizontal components of the cutting forces cancel each other with a zero horizontal force effect.

6. Illustrating the nature of a straddle mill set up.

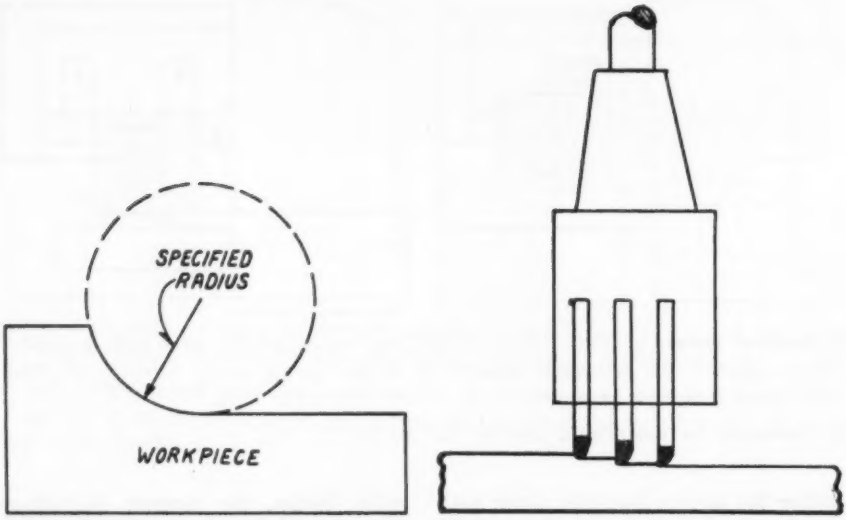
higher the surface foot rate, along with equal or good blade life, the greater will be the output of work; the smaller cutting forces will have a lessened effect upon the machine tool, its maintenance, and repairs. At the same time, the effect of each dollar of capital investment has been doubled. The floor space occupied by the machine has increased in value twice and the end result from every aspect has been made more attractive. And this is based solely on the effect of decreasing the cutting forces by choice of a cutter that makes possible specifying an increase in surface foot rate.

More specifically, the effect of cutting forces can be interestingly discussed on the choice of a cutter in the following approach, used as an example. A face mill should usually be chosen instead of a slab mill. A face mill can be operated at a higher surface foot rate than a slab mill. And this is true whether the face mill and slab both are specified as having high speed steel cutting elements. The choice of a face mill over a slab mill becomes even more imperative when we consider that carbide has never been successfully adapted to slab mills. Hence, the increase in surface foot rate and the corresponding decrease in cutting pressures demand a carbide face mill rather than a slab mill.

Before dismissing slab mills several comments are called for. While the slab mill is seldom justified to-day, particularly, for the milling of a flat surface on a component, still it has its uses and its specification is often justified. For example, if the flat surface on a component is to be milled so as to end in a radius specified as the radius of the slab mill, figure 2, so that two levels are joined as shown in the accompanying sketch, then the slab mill is certainly the most economical way of arriving at this result.

Selection of a Slab Mill

However, cutting forces and their intelligent application play a part in first, the choice of the kind of slab mill and, where that type of cutter is a must, then second, its application to the arbor of the milling machine. A helical slab mill is always to be preferred to a standard or straight edged slab mill



7. Effect of a straddle mill when a radius is to be left on the shoulder of the component.

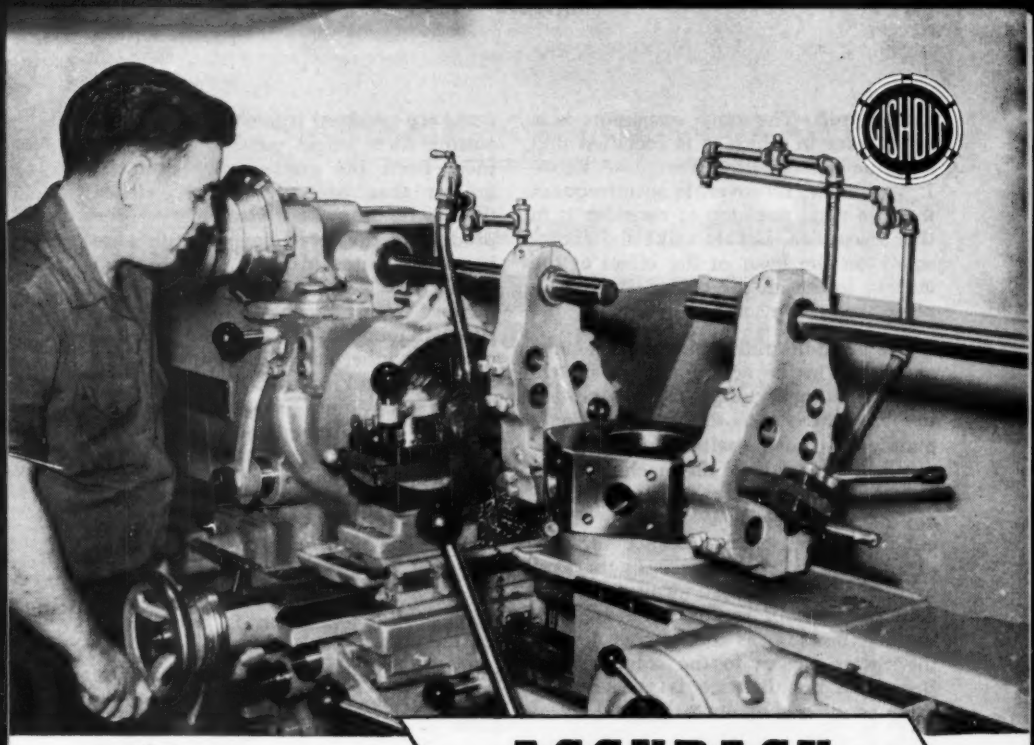
8. Cutting forces associated with a step mill.

The reason is obvious, first, because the helical cutting edges provide shearing action and the cutting effect is much better. Actually, the pounds of force required to mill with a helical edge is less than the pounds of force to remove the same amount of metal with a straight edge. This is the same as saying that a helical slab mill can be operated at less horse power per cubic inch of metal to be removed than a straight-edged slab mill. The second consideration regarding the helical slab mill is even more important. As indicated in the accompanying sketch, the helical slab mill should be set up on the arbor as indicated, figure 3. The reason is plain: the cutting forces that are developed when the helical teeth are removing metal generate a force that tends to force or push the helical slab mill **into or out of** the spindle. As shown in the accompanying sketch, figure 4, if the slab mill is set on the arbor as shown, a horizontal component of force is generated which tends to force the slab mill out of the spindle. This makes for a less rigid setup, less economical metal removal and certainly poorer finish and less acceptable results all around.

The preferred method of applying helical slabs is shown in figure 5. Here the surface to be milled is sufficiently wide to permit specifying two helical slab mills. If these are set on the arbor with the helical angles opposed the horizontal components of the cutting forces cancel each other with a zero horizontal force effect.

Face Mills and Straddle Mills

A choice must now be made between face mills and straddle mills. The accompanying sketch, figure 6, illustrates the nature of a straddle mill setup. It is obvious that since the effect of a straddle mill is to mill a plain surface either with or without a shoulder, the same operation can be performed by



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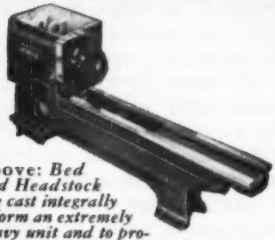

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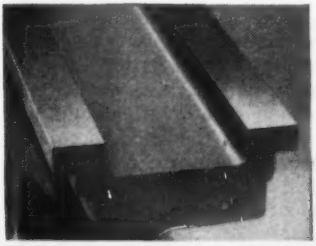
Below: *Block type ways are straddle keyed to the bed and ground in perfect alignment with the spindle. All working surfaces are hardened to 64-66 Rockwell "C".*



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a face mill. The only exception is a component in which it is specified that a radius be left on the workpiece, figure 7. The latter, however, is so infrequent that we need not stop to consider it in this discussion. Let us make the choice solely on the basis of the effect of the cutting forces on the cutter, the workpiece, and the machine.

The straddle mill requires, obviously, as is seen in the accompanying sketch, figure 6, an arbor. Thus the two cutters involved are set on the arbor approximately as shown, with the one close to the column face of the machine while the second one is set away a distance approximately equal to the width of the cut to be taken on the component. This means that the cutting forces generated by the cutter farthest away from the column face will be the same in magnitude, (pounds) as those generated by the cutter closest to the column face. But since the distance is greater and since a number of moveable and fitted parts are involved it is obvious that the cutting force effect on the cutter farthest from the column face will be greater than the other cutter. Hence there will be more vibration since the product of the force times the distance is greater in the instance of the second cutter. It is always true that the cutter farthest from the solid column face, the cutter having the greatest amount of vibration inherent in its setup, will be the first to dull its cutting edges. Yet the entire setup must be torn down and replaced even though only one cutter is dull, namely the one farthest from the support of the column face.

"Aha, Howard, trying to sneak in late again."

Since two surfaces are being milled at the same time and since the amount of metal removed is the same on each side, the amount of power required to perform this operation is doubled as compared with the power required to mill one of these surfaces as might be done with a face mill. Hence it is possible to operate the face mill, other things being equal, at twice the feed rate that must be specified for the straddle mills. Actually, experience indicates that the setup is more rigid, which is another way of saying that the cutting forces are having less effect when a face mill is set on the spindle nose of the machine. The feed rate cannot only be doubled, but can be increased three or more times as compared with a straddle mill setup.

The cutting forces generated in a straddle setup affect the arrangement of the machine, particularly the arbor and its supports, adversely for the reason mentioned above. More detailed consideration of this aspect reveals that the cutting forces generated in the outermost cutter, namely "A" as shown in figure 6, have a greater effect on the cutter and its work than "B", because of the increased lever arm or the distance from the support; namely, the column face of the machine. This in-

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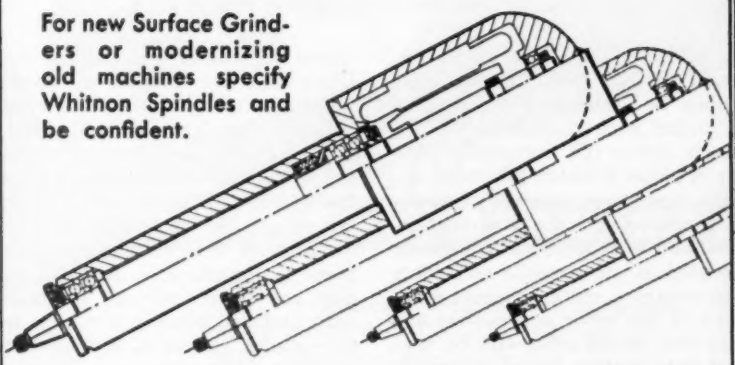

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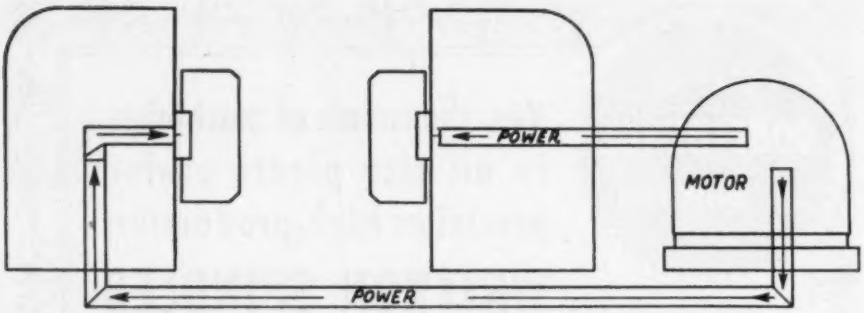

9. In the duplex mill a single drive powers both heads. The head nearest the source of power is at an advantage compared with the one farthest away.

creased vibration dulls the cutter "A" more quickly than "B". Yet the arbor setup must be dismantled when cutter "A" is dulled even though cutter "B" has much more life remaining. The number of pieces between grinds is considerably decreased, relatively speaking, as compared with the face mill setup. Note also that these cutting forces as generated in the straddle mill setup make necessary a more frequent tearing down of the arbor and cutters and supports than would otherwise be necessary if both cutters dulled uniformly because of the effect of the cutting forces. An arbor setup as indicated in figure 6 requires considerable setup time. The down-time on the machine is therefore increased considerably and this is true even when duplicate arbors and cutters are provided. It still becomes necessary to remove the supports which becomes more difficult and involved if an outboard support is included. And the latter should be specified for every straddle mill setup.

Step Mills

Cutting forces as associated with a step mill are as shown in the accompanying sketch, figure 8. A step mill is a series of fly cutters working on different levels or elevations. Hence the pressure on a given elevation is reduced to that of one cutting element. Obviously, the amount of power required for a step mill will be considerably less than for a face mill of the same diameter. The feed rate is reduced in proportion to the reduction of the number of teeth. The reduction of cutting forces as affected by the reduction in the number of teeth on each machining plane is considerable. And the surface that can be milled can be relatively light and can overlay a cavity. In this thin-walled section it is possible to set up three milling planes so that the two top planes are being milled at relatively heavier cuts than the third or last cut. Hence, even though the section of this surface is thin a good finish can be specified and obtained with the lowered cutting force resulting from the light cut being taken by the third or last step. Cutting forces always play an important part in every metal cutting operation. This is frequently a prime consideration where finish is concerned, as indicated in this discussion of an applied step mill.

Duplex Milling

Duplex milling is justified under certain conditions and circumstances but should be given careful consideration with respect to the all important ele-

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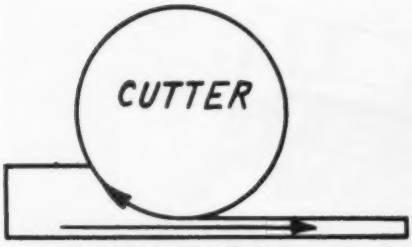
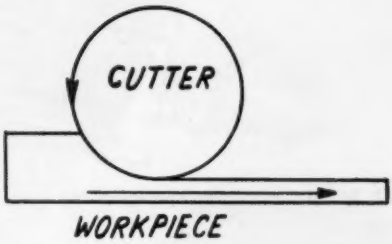




10. In conventional milling the cutting edges of the mill are moving up and against the workpiece. Cutting begins at the bottom of the cut.

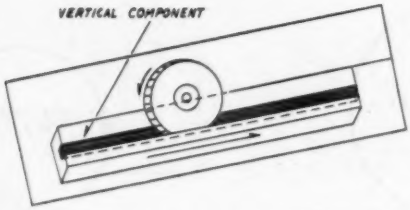
11. In climb milling the cutting edges are moving in the same direction as the job and not against it as in conventional milling.

ment of cutting forces. In the duplex mill as shown, figure 9, a single drive powers both heads, or cutters. The head nearest the source of power is at an obvious advantage as compared with the one farthest away. Both cutters in this milling operation are usually, if not always, called upon to remove the same amount of metal. Yet the cutter farthest from the source of power through relatively longer shafts, more gears and bearings will vibrate more, dull quicker, produce less work than the nearer cutter. This is the obvious result of cutting forces that are being multiplied by longer lever arms.

This duplex setup must be dismantled or torn down even though one cutter is still capable of good machining results as discussed with regard to straddle mills. The effect of the cutting forces that have resulted in greater vibration makes it necessary to dismantle the setup earlier and sooner than would be otherwise necessary. Generally speaking, consideration must be given to the choice of a single face mill or a duplex setup, particularly where a single source of power drives the cutters as indicated. There are some factors in favor of the duplex choice which have to do with less floor space than two comparable single spindle machines but it is quite generally true that a single spindle machine with a cutter closely coupled to the spindle nose of the machine has advantages. Emphasis is placed on **today** since with the advent of carbide greater rates of metal removal are possible; and these greater rates work against the choice of a duplex setup which has less to offer to carbide as a cutting element. And this is due almost entirely to the fact that in the duplex mill the vibration of the farthest cutter is greater which is more damaging to the carbide than it would be to other cutting materials.

The argument concerning conventional and climb milling goes on without end. The merits of each technique should be decided strictly on the basis of cutting forces and their effects on cutter, machine and workpiece.

In conventional milling the cutter is operated as shown in figure 10. Here the cutter is revolving so that the teeth or cutting edges are moving up and against the workpiece or in opposite



12. In this particular operation the cutting forces can be used to do the clamping automatically.

direction to the motion of the component. In other words, the cutting begins at the bottom of the cut.

Climb milling is clearly indicated, figure 11. Here the cutter is revolving in such fashion that the cutting edges are moving in the same direction as the job and not against it as in conventional milling. In climb milling, the cutting begins at the top surface of the workpiece and the tooth exits at the lower elevation.

Conventional and Climb Milling

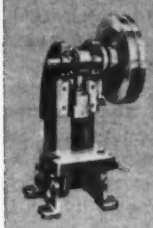
There are a number of interesting considerations concerning conventional and climb milling. Various names are given these techniques. Quite naturally "conventional" and "climb" as laid down here; frequently enough, "up" and "down." The latter designations are perhaps more generally understood, since the cutter is either moving up with respect to the workpiece or down. Another designation, and quite informative, is "with" or "against." Here the cutting and cutter elements are moving "with" the workpiece or "against" it.

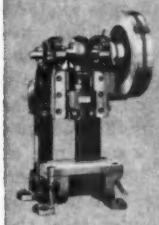
The important consideration in this discussion is the change of direction and the resulting change of influence of the cutting forces with the change in technique from conventional to climb milling. When the cutting teeth move against the workpiece then the forces generated between the teeth and the workpiece are directed away from the cutter and upward, figure 11. In other words, there are two components of this cutting force, the one horizontal, the other vertical. The point is that with respect to the latter the vertical component is directed away from the workpiece and away from the milling table. This is the first important consideration. Obviously, these cutting forces must be restrained by clamps and hold-down devices.

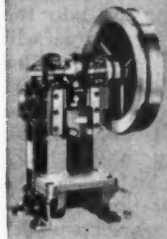
Now consider climb milling in which the vertical component is directed down towards the table. It is directed towards a solid member of the setup, namely, the table of the milling machine and not against a strap or clamp which has been added and which is far less secure or rigid than the table itself. Note also that this vertical component of the cutting force tends to hold the workpiece on the table and consequently adds to the clamping and hold-down pressures or forces which have been applied through fixtures or other means.

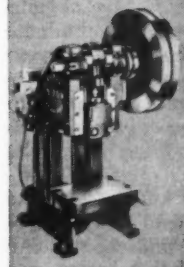
This is not said to discredit conventional milling. It has its place. Nevertheless, the consideration of force direction in climb milling leads to an important consideration and conclusion. If properly directed, the vertical component can be used, in climb milling, to hold the workpiece in place. As a matter of fact, there are regularly conducted production operations where the cutting force is used to hold the workpiece in place in conjunction with in-

TALK ABOUT PUNCH









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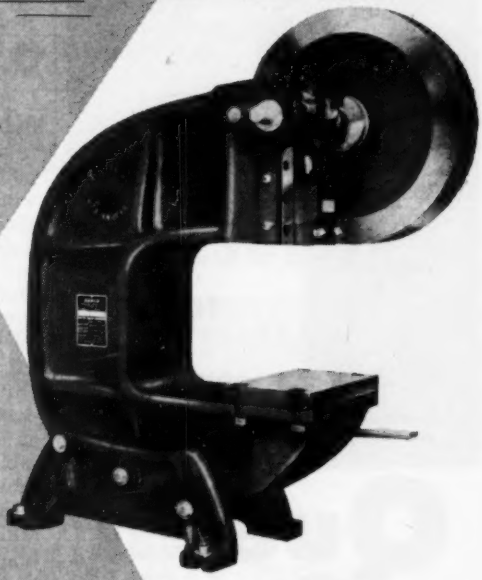

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cidental stops. For example, in the milling of the slot on a machinist's scale climb milling can be advantageously used in this job. If a flat strip of steel is laid down on a milling table with an end stop to prevent the lateral movement of the workpiece in the direction of the horizontal component of the force, and if the climb milling is specified then the cutting forces can be used to do the clamping automatically, as it were, of this thin strip, figure 12.

There are obvious advantages to climb milling when considered from the cutting force viewpoint. And this viewpoint or point of vantage is the only worthwhile one from which to consider these machining operations. The advantages are all based on the existence of the cutting forces and their direction and effect. The milling machine must be so constructed that the tendency of the horizontal component of the cutting force to pull the workpiece into the cutter is counteracted. This force will draw the workpiece towards the cutter an amount equal to the backlash in the table screw or the play between the table screw and its nut. Hence, it is the common practice to-day to design all milling machines—at least those destined for production operations (as distinct from toolroom or job shop work)—with a so-called climb nut adjuster or back lash eliminator. The obvious purpose of this device is to eliminate wholly, or in part, the play or wear that gradually takes place between the table and the nut and thus prevent damage to the cutter when and as it is set up for climb milling. It is to be noted in this connection that the tendency to pull the workpiece into the cutter an amount equal to the play between the table screw and the nut can easily damage not only the cutter but the machine, specifically the arbor, bearings and gear trains. If this movement is considerable and this movement is such that the chip load of the tooth pulled into the workpiece is abnormally

increased then the damage can easily be massive.

The fact that manufacturers recognize that climb milling has a place in machining is evidenced by their design of a climb nut or back lash eliminator.

Keeping in mind that if a machine is in good adjustment, including the wear between the table screw and the nut, then climb milling can be specified when it seems advisable from the analysis of the cutting forces. The vertical component being directed against the table makes this technique attractive. It is obviously better to mill against a solid member than clamps and thin air.

These cutting force considerations should not however lead to an all-out specification of climb milling. There are instances where even with the advantages favoring the climb method, the conventional method is preferred. If, for

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example, a forging with a heavy scale, or a steel casting with a sandy skin is to be milled then, other things being equal, conventional technique is specified. And this must be the choice even though the machine is engineered for climb milling and all other considerations point to the advantages of this method of directing the forces down against solid cast iron table and ways. The reason is plain; in conventional milling, the cutting edges will come up under the scale or sand; they will not pierce through this damaging layer as in climb milling. Forcing the sharp edge of the blades through the scale or sand will quickly dull them and call for removal and reclamation. Whereas in conventional milling good metal is being presented to the cutting edges at all times excepting the break through point which will have slight, if any, effect on them.

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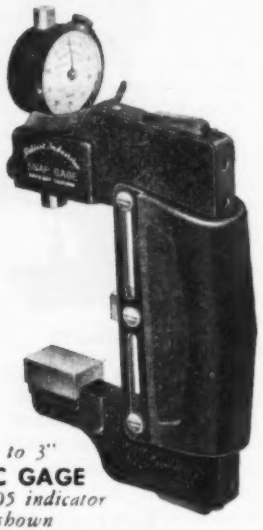

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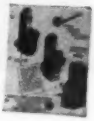

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Material	Shear	Tensile
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Die cast, silicon 5%	22,000	29,000
2S-O	9,600	13,000
2S-¼H	10,000	15,000
2S-½H	11,000	17,000
2S-¾H	12,000	20,000
2S-H	13,000	24,000
3S-O	11,000	16,000
3S-¼H	12,000	18,000
3S-½H	14,000	21,000
3S-¾H	15,000	25,000
3S-H	16,000	29,000
Alclad 14S-O	18,000	25,000
Alclad 14S-W	40,000	64,000
Alclad 14S-T	42,000	69,000
17S-O	18,000	26,000
17S-T	36,000	62,000
24S-O	18,000	27,000
24S-T	41,000	68,000
24S-RT	42,000	73,000
Alclad 24S-T	40,000	64,000
Alclad 24S-RT	41,000	67,000
52S-O	18,000	29,000
52S-¼H	20,000	34,000
52S-½H	21,000	37,000
52S-¾H	23,000	39,000
52S-H	24,000	41,000
61S-O	12,500	18,000
61S-W	24,000	35,000
61S-T	30,000	45,000
75S-O	.....	40,000
75S-T	47,000	88,000
Alclad 75S-O	.....	32,000
Alclad 75S-T	46,000	76,000
Asbestos, sheet	4,000	.....
Brass, cast, leaded red, Cu 85%, Sn 5%, Pb 5%, Zn 5%	36,000	46,000
Die cast	45,000	55,000
Cartridge, Cu 70%, Zn 30%, soft	32,000	47,000
Forging, Cu 60%, Zn 38%, Pb 2%, soft	48,000	60,000
Rolled strip and sheet, Cu 65%, Zn 35%, soft	32,000	46,000
¼ hard	40,000	59,000
½ hard	44,000	65,000
¾ hard	47,000	72,000
Hard	50,000	78,000
Extra hard	54,000	84,000
Spring	57,000	95,000
Britannia metal	9,000	8,000
Bronze, phosphor, grade "A", sheet, annealed	40,000	55,000
Spring temper	65,000	105,000
Cardboard, hollow cutter, chipboard	6,000	.....
Juteboard	11,000	.....
Pressboard	21,000	.....
Copper, soft	24,000	32,000
Hard	37,000	55,000
Cupronickel, Cu 80%, Ni 20%, soft	35,000	48,000
Duralumin, annealed	20,000	28,000
Fibre, hard	24,000	.....
Vulcanized	13,000	15,000
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Gilding metal, Cu 95%, Zn 5%, soft	25,000	35,000

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Inconel (nickel-chromium-iron alloy)	66,000	100,000
Inconel (nickel-chromium-iron alloy)	83,000	155,000
Inconel (nickel-chromium-iron alloy)	87,000	175,000
Iron, cast	25,000	22,000
Cast, malleable	48,000	54,000
Lead	3,500	5,000
Leather, chrome	7,000	10,000
Oak, male and female	6,500	3,500
Rawhide	13,000	.....
Magnesium Alloys:		
Downmetal C, as cast	18,000	24,000
Downmetal C, heat-treated	20,000	40,000
Downmetal G, as cast	17,000	22,000
Downmetal G, heat-treated	19,000	33,000
Downmetal H, as cast	18,000	29,000
Downmetal H, heat-treated	19,000	40,000
Downmetal R, die cast	20,000	33,000
Downmetal J-1, forging	18,000	38,000
Downmetal J-1, hard rolled sheet	20,000	42,000
Downmetal J-1, annealed sheet	19,000	37,000
Downmetal FS-1, hard rolled sheet	19,000	38,000
Downmetal FS-1, annealed sheet	17,000	32,000
Monel metal, soft	50,000	70,000
Monel metal, hard rolled sheet	65,200	108,000
Nickel, annealed	53,000	68,000
Nickel, hard rolled sheet	75,300	120,500
Nickel (German) silver, NI 18%, Cu 65%, Zn 17%, soft	35,000	58,000
Paper, hollow cutter	12,000	.....
Silver, sterling, soft	27,000	37,000
½ hard	45,000	65,000
Steel, mild	50,000	60,000
Armco iron, annealed	40,000	45,000
Boiler plate	55,000	70,000
Casting	60,000	70,000
Hack-saw blade	78,000	105,000
Nickel, 3½%	70,000	85,000
Silicon	60,000	72,000
Stainless, 18-8, annealed	75,000	95,000
Cutlery, knife 410, full hard	145,000	.....
Cutlery, fork and spoon 420, ¼ hard	65,000	.....
Wrought iron	40,000	48,000
Structural	45,000	60,000
Rolled strip and sheet, soft, extra deep drawing	41,000	48,000
Soft, deep drawing	42,000	53,000
¼ hard	45,000	60,000
½ hard	50,000	72,000
Hard	61,000	92,000
S A E, 1010, cold rolled	42,000	56,000
1015, cold rolled	50,000	67,000
1020, cold rolled	52,000	69,000
1025, cold rolled	60,000	80,000
1030, cold rolled	63,000	85,000
1040, cold rolled	73,000	100,000
1050, cold rolled	82,000	110,000
1075, hot rolled	78,000	103,000
1095, hot rolled	80,000	106,000
Tin, block	4,000	5,000
Wood, plywood, hollow cutter	5,000	.....
Zinc, commercial	19,000	23,000
Drawing	16,000	20,000

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By **C. F. Hotchkiss,** President
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WITH an expected loss of Government contracts at the end of the Korean situation, we decided we needed a new product to increase our commercial business. Our principal product is flexible shafting, but we also make a line of flexible shaft concrete vibrators which are sold through construction equipment distributors. We knew that the easiest way to get quick sales for a new product was through our present line of distributors. A letter was sent out to all of these distributors with a list of about 20 products that were already on the market that we believed we could make. They were asked to list in the order of preference the four products they believed would sell best.

When the results came back, it indicated strongly that a rotary trowel for finishing concrete, which was made by only a few companies, would be the best item.

The engineering procedure for the design of this trowel was laid out step by step as follows:

1. Survey including patent studies
2. Preliminary design
3. Preparation of layout drawings
4. Making up shop drawings
5. Building prototype
6. Testing prototype
7. Making design changes in the prototype
8. Making up production drawings
9. Building one machine from production drawings
10. Testing this production machine and making necessary design changes
11. Ordering fixtures, jigs and tooling for first production run

Now that the product was decided upon and the design procedure laid out, the big problem was—**who would design the trowel?** To a large concern with many engineers this would be no problem, but to us (116 employees), it was a huge problem. The product is rather complicated, some patented features had to be avoided, and we wanted some new features which would make this a better machine than the competitors' and yet sell competitively. Also, our distributors wanted this machine

in a hurry. If we designed the trowel ourselves we would have to take on extra engineers since the current small engineering staff was constantly busy with their regular work. On the other hand, if an outside firm was to do the job, it could be done faster, but it would mean a large outlay of cash, without close supervision of the job.

Several outside firms were contacted; one, Designers for Industry, Cleveland, suggested that a "technical survey" be made before going into the design of the machine. This is a separate section of their company and we were not obligated to give them the design job after the survey was finished.

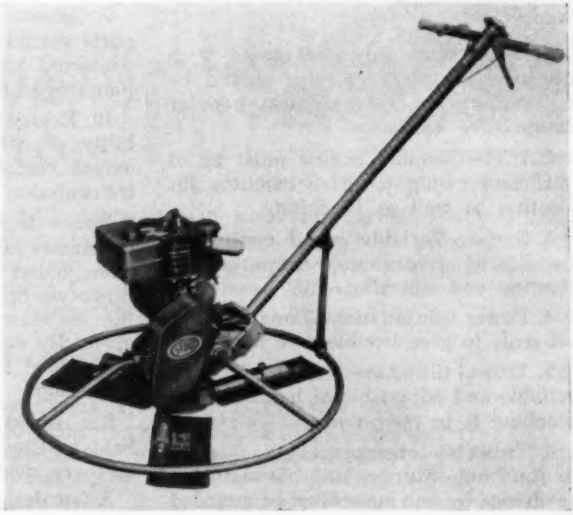
The technical survey was started November 4, 1953. Besides patent study, the technical survey team was to determine:

1. An estimate of sales
2. The over-all picture of competition including the advantages and disadvantages of competitors' machines.
3. What new features were wanted
4. An acceptable price

The survey was made by the design firm who interviewed competitors' distributors and contractors who used rotary trowels. Detailed questions were asked them about the product and what improvements they thought were necessary. As an independent designing firm, they had no trouble getting the information. This information was very useful, not only in confirming our estimate of the potential market, but in the actual designing of the product. The survey took 248.3 man hours and cost $2,086.90 plus $365.43 traveling expenses, or a total of $2,452.33.

A preliminary report on the survey was submitted and a conference held on January 6, 1954. The design firm was asked to present a proposal for just one size machine which would include designing and building the prototype, testing it, and making the production drawings.

Here are the figures in the proposal.



The finished machine, after additional design changes based on further surveys had been made.

	Proj. Mgr.	Proj. Engr.	Proj. Dsgr.	Dsgr.	Drafts-man	Check-er	Exp. Mfg.
Patent Studies & Evaluation	15	30	....	....	....	....	.....
Preliminary	5	50	40	....	80	....	.....
Practical Experimentation	5	30	30	....	40	....	150
Client Conference: Modifications	10	10	....	....	....	....	.....
Final Design	....	40	40	40	....	....	.....
Client Report: Modifications	5	20	....	....	....	....	.....
Design Execution	....	20	20	20	200	50	.....
Prototype, Build, Test	....	40	....	20	40	....	300
Production Engineering	....	50	....	....	....	....	.....
Total Services, Hr., Est.	40	290	130	80	360	50	450
Service Rate Per Hr., $	15.00	10.00	8.50	7.00	5.00	8.50	6.00
Total Services, Amt., Est.	600.	2900.	1105.	560.	1800.	425.	2700.
Total Estimated Labor				$10,090.00			
Materials & Miscellaneous				500.00			
Total Estimated Budget				$10,590.00			

The design job was given to Designers for Industry with the stipulation that DFI submit a preliminary design, which would not infringe any patents, for our review before proceeding. This was covered by items 1 and 2 in the proposal and had an estimated budget of $1840. Therefore, DFI was not to proceed further with the design than the amount $1840 without approval, thus giving us a degree of control. Those features to be considered in the design were:

1. Size—Since only one model is in question at this time, size should be determined on basis of most popular competitive models.

2. H.P.—Gasoline engine must be of sufficient rating to drive machine for floating as well as finishing.

3. Speed—Variable speed control at handle to cover range required for floating and finishing.

4. Power transmission—Long life with oil seals to give trouble-free service.

5. Trowel tilting mechanism—Must be reliable and adjustable at handle while machine is in operation.

6. Trowels—Interchangeable floating or finishing—Sturdy, long life and easy to change by one man. Must be guarded against striking obstruction and damage.

7. Clutch — Centrifugal — Consider automatic throttle release to avoid rotation of handle when accidently released.

8. Handle must be sturdy for proper control of machine propulsion, adjustable to suit operator's height. Also, consider possibility of folding for space conservation in transport and storage.

9. General Construction — All vital parts should be adequately guarded or protected against damage from rough handling in transport from job to job.

10. Engine mounting—Consider possibility of conversion to electrically driven machine when designing power transmission engine mounting surface.

Notice that these were constructive comments rather than restrictive. They were based on the technical survey. Since we had very little experience in the troweling field, design was left open. By not restricting the design, it was hoped to get many new ideas in the design.

Six weeks later a conference was held in Cleveland to discuss the preliminary design.

A few design changes were suggested.

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They were discussed thoroughly. The changes decided upon were written up in detail. It was stated what the manufacturing cost should be, based on our factory rate for labor and material costs.

Authority was given to prepare assembly and layout drawings based on the preliminary design and the changes discussed.

Assuming that all the requirements in function and production cost could be satisfied on paper in time, a second meeting was scheduled in Cleveland ten days later.

This meeting was held, and DFI was given an O.K. to start with the shop drawings from which the prototype would be built.

Details on the prototype design were given to our Sales Department so that they could discuss them with their distributors. Several design changes were made as a result of this, including the make of the engine. Distributors said the machine would not sell with the make of engine that was proposed, simply because it was not well known in the field.

The prototype was completed and shipped to Binghamton where it arrived on April 29th. Testing on a slab was begun immediately and compared with competitors' models on the same job. As a result, some changes were made in the machine. The machine was tested further. Pictures of the prototype were sent to all distributors, some of whom suggested design changes. One of these suggestions was to lower the height of the guard ring so that the machine could go under pipes which are often only 6 inches above the concrete. This was done.

At this point we decided to do the production drawings ourselves rather than let DFI do them as was originally planned, believing we could make these drawings quicker, since we knew just what machines we had to make the parts on. All work was terminated immediately with DFI. The breakdown on the cost of design to date, excluding the technical survey, was as follows:

	Proj. Engr.	Proj. Dsgnr.	Proj. Mgr.	Layout Dsgr.	Machinists	Lab. Asst.	Total
Rate	$10.00	$8.50	$15.00	$7.00	$6.00	$5.00	
Hours	296.2	17.7	10.00	318.7	445.6	2.1	
Total Cost	$2,962	$150.45	$150	$2,230.90	$2,673.60	$10.50	$8,177.45

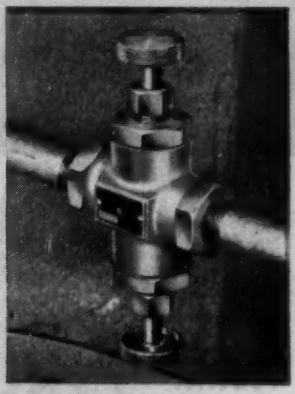
DYKEM
STEEL BLUE
Stops Losses
making Dies and Templates
Popular package 8-oz. can fitted with Bakelite cap holding soft-hair brush for applying right at bench; metal surface ready for layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, prevents metal glare. Increases efficiency and accuracy.
Write for sample on company letterhead
THE DYKEM COMPANY
2301G North 11th St. • St. Louis 6, Mo.
DYKEM STEEL BLUE
With DYKEM Steel Blue
Without DYKEM Steel Blue

PROPER CONTROL OF AIR WITH *NORGREN* VALVES

gives you

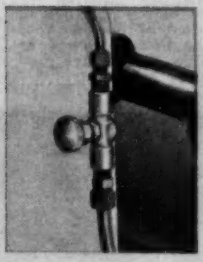
- **better air equipment performance**
- **less equipment maintenance**
- **lower air costs**

Automatic Relief Valves protect equipment from damage resulting from excessive pressure build-up and provide controlled operation of fluid recirculating systems. ¼" to 1".



Adjustable Air Governors
Improve cylinder performance by accurately regulating work and return strokes. Two-way and single-way for lines carrying air, oil, water, steam, non-corrosive gases and liquids. ¼", ⅜", ½".

Blow Guns
For removing dust, chips, water, etc., from parts in production, work benches, machinery, dies, testing devices, office machines. Lever, button and flex types of air controls.



Needle Valves
Provide an adjustable orifice for controlling the rate of flow of air, liquids, and gases, or for use as shut-off valve. Pressures up to 250 psi. ⅛", ¼".

C. A. Norgren CO.
3438 SO. ELATI ST. ENGLEWOOD, COLO.

WRITE FOR NEW CATALOG SHEETS

PIONEER AND LEADER IN OIL-FOG LUBRICATION FOR 26 YEARS
Valves • Filters • Regulators • Lubricators • Hose Assemblies

The total of $8,177.45 was less than the estimated total since we decided to make our own production drawings.

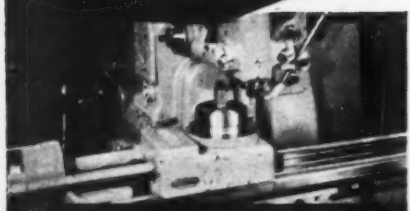
The total paid, including the technical survey, was $10,629.78.

The production drawings were completed and one machine was made. The production model was tested thoroughly, and when proven satisfactory, a run of 50 machines was ordered. These will be put in the field to get the reaction of the users before going into full production.

By using an outside design firm we not only obtained an excellent design, but obtained it much quicker than had we done it ourselves. Also, we did not add more engineers to the payroll, nor lay aside other necessary engineering work.

The End

How To Increase Production And Improve Accuracy



With a SUNDSTRAND Automatic Index Base

In many cases, the addition of this Automatic Index Base has increased milling production enough to eliminate need for the purchase of additional machinery. It may be the answer to your milling production requirements. Call in a Sundstrand engineer. There is no obligation for this service.

Accurate Spacing, Powerful Clamping Insures Accuracy

Sundstrand Automatic Index Base

This automatic index base is designed so there is no strain against the index plunger during the cut. The base is locked by powerful clamping so that accuracy of index is not affected by heavy cuts.

Get Complete Data Free

This 8 page booklet contains production figures and specifications. Send for your copy today. Ask for bulletin 450.

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Columbus Die-Tool has been solving tooling problems for over 45 years. Expert designers and builders of all types of tools and special machinery. Write us today!

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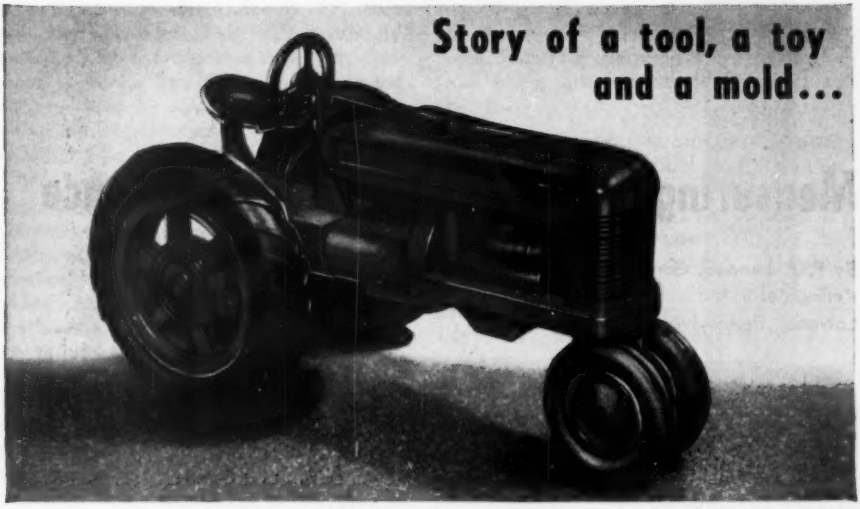


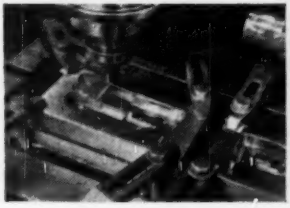
Photos and data courtesy of: Product Miniature Co., Inc., Milwaukee, Wisconsin

...another complex mold milling problem solved by the Rotary Head method

NOTICE the fineness of detail on this scale model! A Kearney & Trecker-Milwaukee Model 2D Rotary Head Milling Machine reproduced those details in the mold. No models or templates were used — the operator worked direct from blueprints. Workpiece material was oil-hardening tool steel.

Work was done from exact scale reductions of the real tractor assembly prints — with only minor details eliminated. There were no delays in beginning, no extra operations. Blueprint dimensions were transmitted directly into metal and fine accuracy was possible because precise control of all operations is built right into the machine.

This exceptionally versatile machine can reproduce geometric shapes in both horizontal and vertical planes. If you have an unusual production problem, it will pay you to investigate the Model 2D Rotary Head Milling Machine. Write for Bulletin D-20, Kearney & Trecker Corp., Milwaukee, 14, Wisconsin.



KEARNEY & TRECKER MILWAUKEE MACHINE TOOLS

Measuring Diamond Wheel Performance

By **F. J. Lennes**, General Superintendent,
Kennametal Inc.
Latrobe, Pennsylvania

MEASURING the performance of diamond wheels on actual production work is most important in every shop where diamond wheels are used as a part of the standard grinding method. There are several reasons why an actual "standard of performance" is so essential where any quantity of diamond wheels is used.

In the first place, all diamond wheels are not the same, so in order to measure one against another some standard is necessary. Diamond wheels are considered as a rather costly tool by most shops, and the use of the best wheel will result in lower operating costs. To find the best wheel for a given job, comparative tests must be made and a standard established.

Then, too, all diamond wheels do not cut at the same rate of speed. For example, metal bond wheels cut slower than resinoid bond wheels. On the other hand, metal bond wheels generally last longer. Since the slow cutting wheel increases the manufacturing cost by requiring a longer time to grind a unit of production, there is a point where resinoid bond diamond wheels become more economical than metal bond, and vice versa. To find the cross-over points against a measurement of performance is required.

Of extreme importance in checking diamond wheel performance is the need for everyone to do whatever is possible to stretch out the limited supply of industrial diamond bort that is available to us. Import figures and NPA reports have indicated that we cannot expect the supply of industrial diamonds imported into this country to increase to any great extent. Yet cemented carbide manufacturers continue to expand their facilities, providing more and more carbide to meet the

Diamond wheel selection for low-cost grinding must be efficient. Increase in carbide use and static supply of diamond bort make preservation of diamond wheels a must. Tests must be made to determine best type of wheel. These tests will repay you in economical diamond wheel selection.

ever-increasing demands of industry for their product. This will naturally result in increasing demands for diamond wheels, but since these cannot be produced in sufficient quantities to meet the requirements, other methods will have to be established.

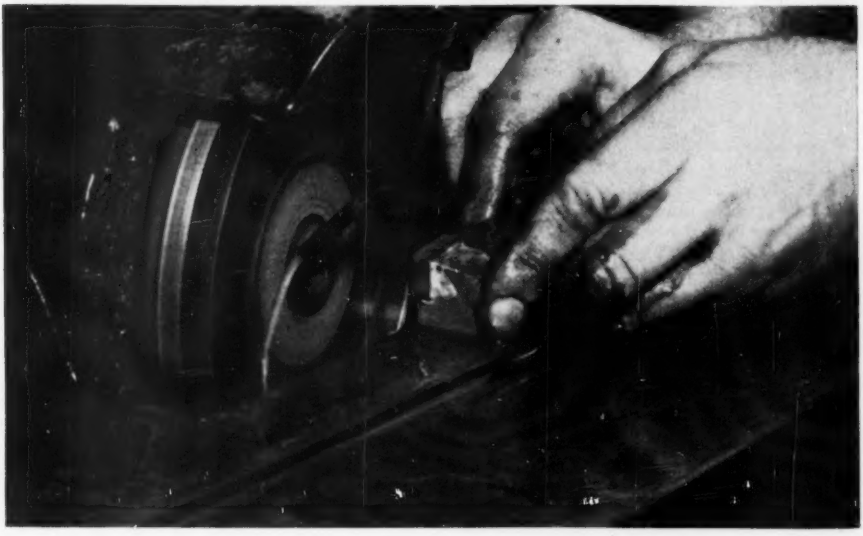
We have seen many indications of this already with the introduction of electrolytic grinding, abrasive belt finishing of carbide tools, electro discharge methods of forming and finishing carbides, and many others. All of these methods are directed toward the saving of industrial diamonds. There is no question that these and other methods being tested are important to us and require the attention and interest of every user of diamond wheels in this country.

Along with these efforts we should give an equal amount of attention to our diamond wheel grinding methods. There are many possibilities for us to do a better job of spreading out the supply of industrial diamonds and at the same time reduce our operating costs. Wasteful diamond grinding practices today are inexcusable as well as costly.

In order to improve our performance in this respect we must first be able to measure what we are now doing before we can expect to improve on it. It is true that some costs will be involved in checking wheels, keeping records, etc., but, as we said before, we are dealing with an expensive tool and the effort will be well worth while.

To actually demonstrate how such information can be accumulated, let us take a simple case and build up from there. Let us assume that we want to check the performance of a metal bond wheel versus a resinoid bond wheel on an offhand grinding operation such as that shown in Figure 1. Let us assume we have two hundred carbide tools to grind, Style AR12. We

1. Offhand diamond grinding operation on cemented carbide tools. This is the type of grinding described in developing the figures on wheel costs and wheel performance.



2. Measuring diamond wheel thickness prior to starting grinding tests.

would first divide the tools into two lots of one hundred tools each, one lot to be ground by the resinoid bond wheel, one by the metal bond. Before mounting the wheels they would be carefully measured for thickness as shown in Figure 2, taking at least three measurements on each wheel and arriving at an average thickness.

The first wheel would be mounted and the one hundred tools ground. Then the operation would be repeated with the second lot using the other wheel. Floor to floor grinding times would be accurately recorded for each lot. At the conclusion of the test, the thickness of each wheel would be measured as before and the difference in the wheel thickness would represent wheel wear. The area of carbide ground could be readily calculated and the amount of carbide area ground per each thousandth of wheel wear determined. Checking only the area of surface ground would be accurate enough provided the two hundred tools were the same. Greater accuracy can be obtained by measuring the volume of carbide ground. This would be essential if there were any great variations from tool to tool.

Having collected this data, a simple comparison chart could be prepared in the manner shown in Figure 3. These figures are hypothetical and are not necessarily what you would find in such a test.

On this sample test chart it can be readily seen that the grinding cost in terms of time required is lower for

3. DIAMOND GRINDING TEST

Purpose of Test: Determine comparative grinding cost of resinoid bond diamond wheels versus metal bond diamond wheels.

	Metal Bond	Resinoid Bond
Wheel Specification	D150-50-M⅛	D150-R50-B ⅛
Test Machine	Hammond 6 B Grinder	Hammond 6 B Grinder
Style Tool Ground	AR12	AR12
Grade	K6	K6
Number of Tools Ground	100	100
Time Required to Grind Tools	3 Hours 10 Minutes	2 Hours 30 Minutes
Time Required to Grind per Tool	1.9 Minutes	1.5 Minutes
Grinding Cost ($5.00 per Hour)	$15.83	$12.50
Grinding Cost per Tool	$ .158	$ .125
Wheel Wear	.002"	.008"
Number of Square Inches Ground per .001 Wheel Wear	29.4	7.35
Wheel Cost	$190.00	$200.00
Wheel Cost per .001"	$1.52	$1.60
Cost of Wheel Consumed on Test	$3.04	$12.80
Wheel Cost per Tool Ground	$ .0304	$ .128
Total Cost per Tool (Grinding Cost plus Wheel Cost)	$ .1884	$ .253

the resinoid diamond wheel, but that this is more than overcome by the extra cost of the wheel. Therefore, on this theoretical operation the most economical wheel for the job would be the metal bond wheel. It will take longer to do the job, but in this case it would be more economical to buy another grinder and maintain the production rate than to continue using the resinoid wheel. In the efforts of diamond conservation, our hypothetical case would indicate that one metal bond diamond wheel here could do the same amount of work as four resinoid bond wheels.

This is just one sample of the type of testing that could be done. As a follow up the metal bond should be compared against a vitrified bond, one grit size against another, one manufacturer's wheel against another's. Also, a similar test to provide the answer in comparing the cost of a diamond wheel versus a silicon carbide wheel.

Another example would test one grinding coolant against another on identical wheels. This is a test that may bring surprising results. Similar tests conducted on different coolants have indicated that wheel life can be affected by a ratio of 2:1 by merely changing coolants.

A test on dry grinding versus wet grinding, using identical diamond wheels grinding cemented carbides, will prove conclusively the wastefulness and excessive costs that are incurred by dry grinding.

These tests are by no means limited to offhand grinding operations. Similar tests on surface grinding, cylindrical grinding, etc. will be helpful in selecting the best and most economical wheel for your job.

The End

Simple Revolution Counter

By **George Middlebury**

EVERY maintenance mechanic can afford a revolution counter of the type illustrated, provided that he has a wrist watch with a sweep-second hand for timing purposes to use with it.

Most revolution counters incorporate some form of reduction gear which reduces the speed of the driving means so that the revolutions can be counted or observed by eye. The reduction gear on the simple revolution counter shown is in the form of a 12 in. length of threaded rod, with a thread pitch of at least 40 t.p.i. If the rod is driven by the shaft end whose speed is to be read, a nut on the rod will travel through 1 inch every 40 revolutions. If the nut travels through a length of 10 in. in 15 seconds the r.p.m. of the revolving shaft will be:—Length travelled by nut x thread pitch x time (minutes) or:— 10 x 40 x 4 = 1,600 r.p.m. The 4 in the

HIGHER SPEEDS!
FASTER GRINDING!

kipp

AIR GRINDERS

MODEL JA
50,000 R.P.M.
$42.00
IN U.S.A.

Weight 12 ounces; length 6¾ inches; chuck size ⅛ inch. Wheel guard removed for better illustration.

The RPM's stay up while grinding . . . not only when the grinder runs idle. That means better work—longer wheel life.

High speed grinding with small wheels was a Madison-Kipp development of the late twenties. It was born out of a pressing need in our tool room. Because tool room grinding problems are universal, we believe it will pay you to utilize Kipp grinders in your tool room as generally as we do in our own.

kipp

MADISON-KIPP CORP.
207 Waubesa St., Madison 10, Wis., U.S.A.

equation is derived from 4-15 second periods in one minute.

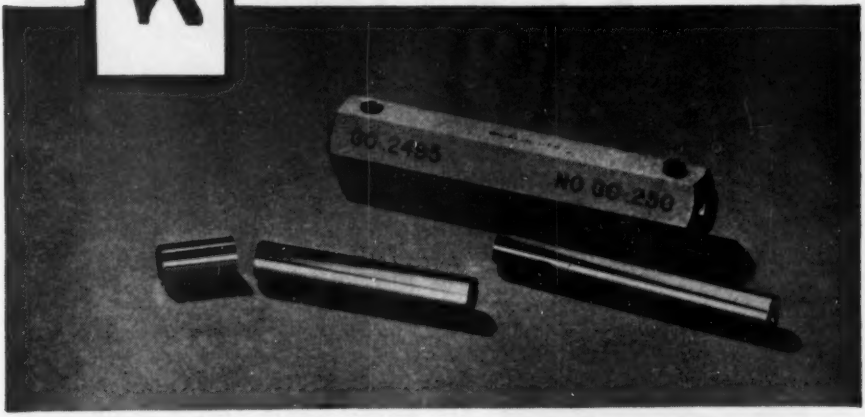
The rod shown is fitted at one end with a conical rubber driving tip for engagement with center hole in the end of a rotating shaft. By removing the driving tip and gripping the end of the rod in the chuck jaws of a lathe or drill press, the true spindle speeds of the machines can be obtained. One advantage of the small diameter driving tip on the end of the screwed rod is its ability to penetrate the openings in a guard over the end of a revolving shaft; the speed of a guarded shaft can thus be checked without having to remove the guard.

In use, the revolution counter has the nut set flush with one end. The watch or clock used for timing is observed until the second hand reaches one of the quarter-minute marks on the dial, the conical driving point is then pushed into contact with the shaft end and is pressed thereto by one hand gripping the nut which will travel along the thread. At the next quarter-minute interval, end pressure on the rod is released thus breaking the driving connection. The position of the nut in relation to the rod end is then measured accurately with a steel rule and this length is used in the calculation given earlier.

The direction of rotation of the driving means may cause the nut to travel away from, or towards, the driving point. If the direction of travel is away from the point, the nut is set initially in contact with the back face of the point and this forms a datum face against which to place the rule end for measuring the length of nut travel. Calculations will be eased if decimals are used for measuring the length of travel and these can be converted fractional rule readings or, better still, a rule calibrated in tenth inches and parts of tenths used.

The End.

VK WIRE TYPE PLUG GAGES



VASTLY LONGER-LIVED AND MONEY-SAVERS

BECAUSE THEY'RE "CUT-OFF-ABLE" AS WELL AS "REVERSIBLE"

As a Van Keuren agent put it, "They're not only reversible, they're cut-off-able." And that means when you buy Van Keuren Wire Type Plug Gages, the sizes below 3/8" may be cut off when ends become worn and as many as from five to ten gages made available from the 1 7/8" and 2" long units. It is not only economical and practical to use Van Keuren Gages but it is a very simple operation to cut off the ends by following instructions furnished on request. The illustration above shows clearly the cut-off and reversible features.

VK Wire Type Gages are available in ZZ to XX accuracies in sizes from .001" to 1.000". They are furnished in alloy tool steel, high speed steel, chromium plate or tungsten carbide. Whatever the gaging job, the extra length provided in VK units will save you money. It will also pay you to take advantage of VK deliveries. In many cases we can ship your requirements from stock.

VK Wire Type Plug Gages are fully described in Catalog & Hand Book No. 35, available on request by writing to: The Van Keuren Co., 177 Waltham St., Watertown, Mass.

VK

35th YEAR

THE Van Keuren CO.,

177 WALTHAM STREET, WATERTOWN, MASS.

Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carboloy Cemented Carbide Plug Gages • Carboloy Cemented Carbide Measuring Wires • Chrome Carbide Taper Insert Plug Gages

CHIP-HOG

Heavy Duty Turning Tools

GAIRING TOOLS

For Maximum Feeds & Speeds on Any Machine

SAVE ON GRINDING COSTS with replaceable carbide inserts. They're furnished by us or by carbide manufacturers with pre-formed front and side clearance angles and ground seating surfaces.

LONG CARBIDE LIFE insured by two-way adjustment; forward by built-in adjusting screw, sideways by serrated clamp. Buttress serrations will not slip, hold carbide rigid.

DURABLE SHANK of special high-alloy steel, heat-treated for toughness and rigidity, outlasts many brazed tools. Tool steel anvil under carbide allows harder carbide grades, protects shank.

3 HOLDER STYLES, each right- and left-hand, made for straight turning, plunge cutting, and turning to shoulder.

TYPICAL CASE HISTORIES

Gun Barrels, heat treated steel castings, 280 to 340 Brinell, 9″ to 11″ dia., cut 1/2″ to 3/4″ deep, 34 RPM, .032″ feed.

Worm Shafts for Speed Reducers, 4140 SAE steel, 5″ dia., cut 3/8″ to 1-1/4″ deep at 250 SFM, .011″ feed.

WRITE FOR CHIP-HOG BULLETIN AND PRICE LIST

The GAIRING Tool Company

21228 Hoover Road, Detroit 32, Michigan

MODERN TOOLS in ACTION

Blanking and Redrawing of Cans Turns to Automatic Operation

High rates of rejections on finished parts and cumbersome space consuming equipment were two problems solved when the Vulcan Tin Can Co., Bellwood, Illinois, mechanized their can blanking and redrawing operation.

This job formerly performed manually is now done on a hydraulic press equipped with an index table, both manufactured by The Denison Engineering Company, Columbus, Ohio.

The Multipress is a self-contained six ton "C" frame type press which provides big press advantages and open height in a size that conserves floor space. It is one of a special series designed to replace heavier, outmoded equipment. The equipment replaced by this automatic press method was a large mechanical press which was manually fed and which required elaborate worker safety precautions.

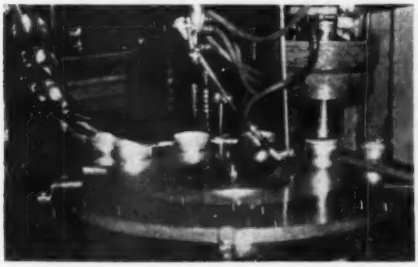
The index table coupled with the press provides completely automatic operation.

The action of this index table is interlocked through the hydraulic system of the press for positive sequence of movement. The table dial is regulated for approximately 35 indexes per minute.

By the use of automatic hoppers to feed workpieces to the index table and automatic ejection devices which dispose of finished parts the operation is made completely automatic. In this instance the ejection device used in a "brush off," but compressed air, push-out and punch-through are some others that could just as easily have been adopted.

The hoppers feed the preliminary shells which are to be redrawn, onto the index table, shown below at left. The table indexes in positive sequence with the action of the press ram through the control system of the hydraulic power unit. As each can is redrawn, another is moved into position down the hopper feed and onto the index table as the press ram ascends. The stroke length, ram speed and tonnage of press have been previously regulated to assure uniform pressure application for every cycle, regardless of dimensional variations in this particular operation.

Ejection of work pieces is accomplished through the action of the index table. As the part is carried from the ram station, it is caught by a rail mounted above the



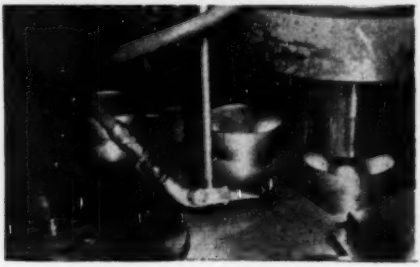


table. As the table moves to the next position, the motion carries the work piece off the table into a chute, as in photograph at right.

Approximately 2,000 cans are drawn each hour using this automatic method which is so cost-saving as to have paid for itself after a few months' operation.

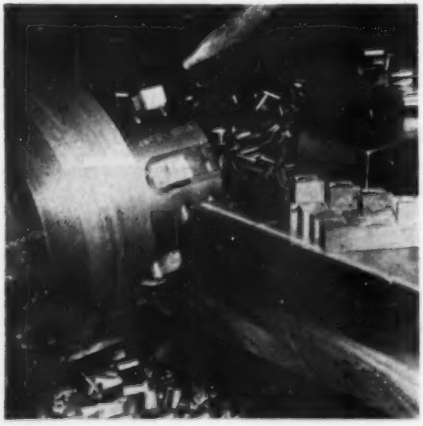
An added precaution against part damage in this operation is the installation of a nozzle which sprays a lubricant on each part in process.

The Multipress has proven that lower pressure properly applied, often produces better quality products than misapplied higher pressure, which is costly, not only from the standpoint of increased scrap loss, but also through the inefficient use of power.

Carbide step-mill adapted to handle 13-foot SAE 4140 steel spars

Milling 2½" x 3" x 156" long offsets in aircraft spars is being done in only one pass with step mills utilizing tungsten carbide-tipped inserted blades. Heretofore, with high-speed cutters, five passes were required. In addition the operation is now performed at increased speed with resultant longer life between cutter regrinds.

Milling 2¼"x3"x156" long offset on one pass on SAE 4140 steel aircraft spars with step mills utilizing Kennametal tipped inserted blades. Set of four lug-type blades, shown on workpiece, each take proportionate amount of the 2¼" wide cut at 1⅛ IPM and 160 RPM. Milling time with these cutters is only 20 minutes. With 6" diameter high-speed shell mills run at 2.5 IPM, 44 RPM, and ½"x3" cut, the milling time was 20 hours requiring five passes.



This technique is being used by Fred N. Wells Inc., of Los Angeles, Calif.

The hogging cut is made on two SAE 4140 (normalized) steel bars at one time using left and right-hand cutters on an old 20-horsepower Ingersoll double-side head planer mill built prior to 1920. To obtain a higher operating speed for the most efficient use of carbide cutters, roller bearings were installed in each side head-spindle. Prior to offset milling, the sides of each bar are face milled to remove any adhering forging scale.

With the 6" diameter high-speed shell mills run at 2.5 IPM, 44 RPM, and ½" by 3" cut, milling time for two bars was formerly 20 hours. This operation is now performed in only 3 hours with a cutter similar to a standard style 4"—50 step Kennamill. They use 5" diameter left and right hand step mills each having four brazed inserted-blades which are carbide tipped with Grade K2S Kennametal 3/16" x ½" x ¾" long. All blades have a 7-degree negative radial rake; a 10-degree positive axial rake on blades 1 and 3, and a 10-degree negative axial rake on blades 2 and 4. Each blade takes a proportionate amount of the total 2¼" wide cut at 1⅛ IPM and 160 RPM. Chip-load is 0.007" per tooth; depth of cut is 3".

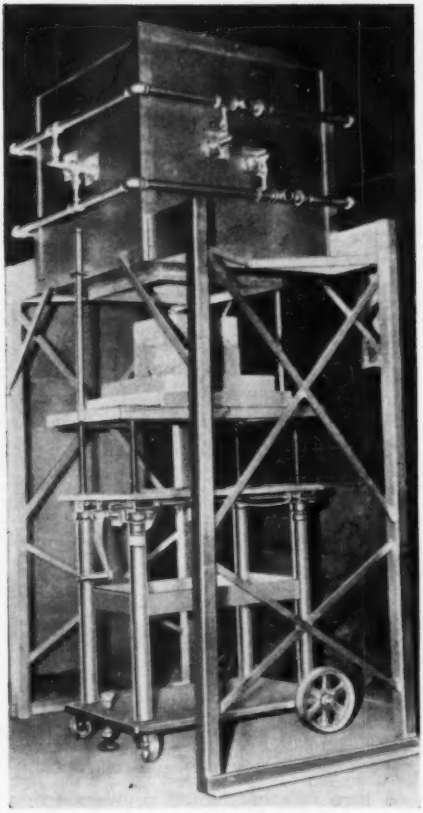
Climb milling is used to within 3" of the bars' ends, after which the ends are cut off. Enough surplus lengths permits sawing bar stock to finished length. This method is used because the machine has no backlash control on its feed gear.

Formerly each high-speed steel cutter required three regrinds to mill one piece at a cost of $30. With the carbide cutters two bars are milled, then cutters are reconditioned. To regrind the removeable carbide blades, which is done on a conventional tool offhand grinder, requires only 30 minutes per cutter.

Portelvator loading feature of ceramic furnace

Portelvator becomes an integral part of a special ceramic firing furnace designed and built by the Waltz Furnace Co., Dept. B, Cincinnati 2, Ohio.

Loads of 2000 pounds can be moved easily through the plant. There are two non-swivelling wheels, 9" diameter and 1¾" tread, and two single wheel swivel casters, 4" diameter and 1½" tread, allowing the Portelvator to be turned in a minimum of space; narrow aisles and



sharp turns do not handicap movement.

With the table in lowered position of 37″ the upright rods on the ends of the table are disengaged from the guides on the furnace, allowing the Portelvator to be moved to any location to be unloaded, reloaded and then returned to the furnace for firing. Furnace hearth and door mounted on the 21″ x 33″ table top, with the load in place, is raised 27″ to the sealing level by means of a hand crank which operates a worm, worm gear, and screw in each of the four corners of support. This lifting mechanism in the four corners prevents the table and load from settling when raised in position for firing.

Grinding wheels dressed to any angle

Grinding wheels are dressed to any angle desired with accuracy and considerable speed at Temco Aircraft Corp. The firm has adapted a Hardinge lathe compound or head to do the dressing. The compound can be mounted between the centers on cylindrical and thread-grinders, or it can be used on surface grinders.

Temco's thread grinders have automatic provisions for dressing their grinding wheels to angles of 15 or 30 degrees. But any other degree of angle formerly had to be dressed by hand. This was time-consuming and sometimes inaccurate.

Temco's grinder operator Harold E. Hall devised the adjustable wheel dresser. He mounted the Hardinge compound—with attached degree marker—on a 4½″ x 6½″ block of ½″ steel with a T-bolt slot. Then he drilled a center hole at each end of the block, 90 degrees to the slot.

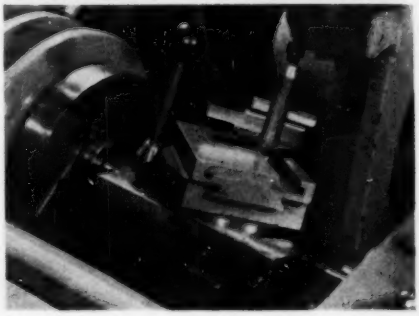
Thus, when the Hardinge compound is mounted between the centers in grinder, the zero point on the degree marker is opposite the edge of the grinding wheel and perpendicular to its axis.

The diamond holder on the Hardinge compound can be be swiveled, lined up and locked at any one of the 360 degree marks on the degree marker. Thus, if the compound is set 14 degrees to the right of zero on the marker, for example, it will cut a precise 14-degree angle on the left side of the grinding wheel.

The diamond holder has a lateral travel of ¾″ in a dovetail slide. This travel governs the width of the cut made on the grinding wheel.

Wheels dressed with Hardinge compound are accurate to 30 minutes. This precision, and the ability of the Hardinge compound to dress wheels to any angle, permit operators to do a variety of grinding jobs on their conventional machines.

Thread-grinder centers and other types of live centers, can be re-ground with absolutely no "run-out." Draw broaches



with 7-degree primary lands and 45-degree secondary lands, which can be fashioned from scrapped reamers, are ground on the company's thread-grinders.

Grinder operators also have ground router collets with 10-degree angles as well as assemblies for various tooling jobs. Recently they ground crush-dresser rolls used to dress wheels for manufacture of serrated aircraft parts.

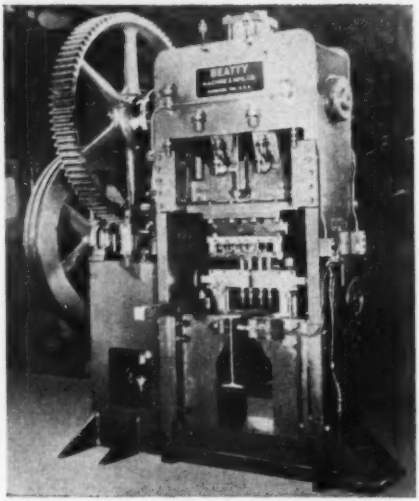
Basco separators cut costs, injuries in Cutler-Hammer's New York plant

Use of Basco Mfg. Co.'s magnetic separators in the punch press department of Cutler-Hammer, Inc., leading electrical manufacturer, has resulted in significant savings in labor costs and almost completely eliminated injuries from one phase of the firm's operations. Cutler-Hammer reported that since installation of the separators in its New York plant last year a five percent savings on labor has been achieved. Cutler-Hammer makes switchboxes and covers in its operation, using 16 to 18 gauge steel sheets of varying sizes. Prior to the introduction of the separators wear and tear on the operators' gloves was considerable, and this is an additional cost that has been cut greatly.

Photo shows an operator at Cutler-Hammer's New York plant first lifting a steel sheet before inserting into the punch press. Action of the separator has raised the top sheet making lifting simple. After the operator inserts the first plate into the press the next plate is already raised from its mates and ready to be lifted. Before introduction of the separator, Cutler-Hammer used a sharp metal instrument to separate the sheets. The result was great wear and tear on gloves and numerous painful hand cuts among the workers. Manufactured by Basco Manufacturing Co.; available from E. V. Nielsen, Inc., International Sales Agents, 129 Broad St., Stamford, Conn.

Guillotine beam flange punch

A guillotine beam flange punch with new built-in adjustable tools for flange punching of beams has been announced by the Beatty Machine & Mfg. Co., Dept. MTB, Hammond, Ind.



A turn of a handwheel provides quick change of punching centers, at the same time synchronizing punch with die.

The adjustable flange punch tools consist of two frames which open and close about the center line of the beam. There are four punching units, with a minimum setting of 2¼" between inside punching units, and a maximum setting of 6¾". The centers between the inside and outside punches can be adjusted from 2¼" up to a maximum of 3½". Capacity of machine is 200 tons.

Buhr special 3-way boring, facing, tapping machine

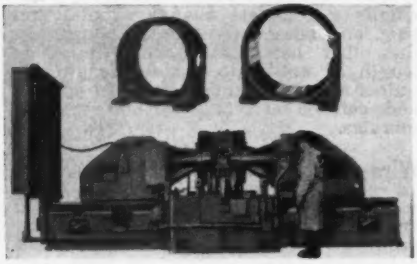
One of the world's largest electrical appliance manufacturers has just received this Buhr special 3-way boring, facing and tapping machine.

The machine is designed to enable the customer to process eight different stator

frames at the rate of 60 pieces an hour at 80% efficiency.

Before this machine takes over, another Buhr special mills, drills and reams the four legs, and drills the four conduit box holes. The part is then transferred to this machine and positioned in fixture at loading station.

The fixture then automatically indexes 180° where two opposing spindles finish-



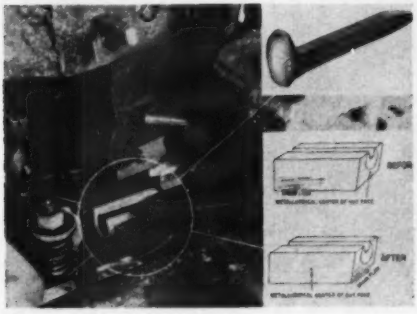
bore stator hole and face rabbet bores, simultaneously tapping four conduit box holes with the tapping unit mounted in the rear.

Die life improved with change in design and heat treatment

The Railway Accessory Department of Inland Steel Company was experiencing extremely short life with the dies used in the production of railway spikes.

The dies, which received heat treatment in the conventional manner (hardened and tempered) were made of low carbon, molybdenum high speed steel.

Life of the dies was inconsistent. Complete failure or breakage often occurred after producing as few as 50 or 75 kegs of spikes, while other dies lasted for hundreds of kegs.



Engineers of Inland Steel Co. and Lindberg Steel Treating Co. cooperated in attempting to solve the problem.

Investigation revealed the dies were made from bar steel in such a manner that the grain flow was parallel to the direction of the principal applied stress.

It was also established that the principal stress was directed against the metallurgical center of the bar. Both of these conditions, it was felt, contributed to poor die life. Therefore both were corrected by using a wider bar and machining the dies transversely therefrom.

This change in the method of machining the dies resulted in improved life. However, the improvement was not sufficient and further investigation concerning the failures was necessary.

The principal cause of failure was heat checking which eventually lead to complete breakage of the dies. Once heat checking started, the network of cracks acted as notches promoting rapid fatigue type failures.

On the basis of the prevailing experience, it was decided to try carburizing the dies in order to produce a tough core and a hard case, the latter providing compressive stresses on the surface which would tend to minimize the propagation of the heat checks after they formed.

The following treatment was developed and applied to a substantial quantity of dies.

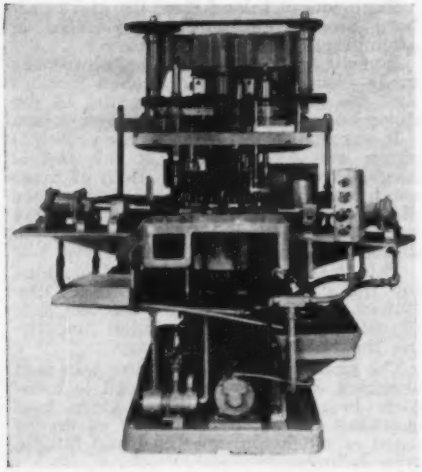
Pack carburize in charcoal at a temperature of 1850°F. to produce a case depth of 0.032-0.045". Quench in oil and triple temper to produce a hardness of 58-60 Rockwell "C" on the case. Blast with sand or steel grit after heat treatment.

The redesign of the die plus the change in heat treatment was definitely successful according to C. E. Chapman, superintendent of Inland Steel's Railway Accessory Department.

Automatic mass processing of short runs

The Bodine Corp. was recently presented with the problem of mass processing 3 different parts having 22 variations in size and hole positions. All drilling, tapping, and milling operations had to be held to close tolerances.. The parts were to be used in marine outboard motors.

Because of the extreme flexibility of Bodine's basic machine design, their engineers were able to tool up their standard model 41-20 to process all 3 parts. One of the unique design features, incorporated to save an extra handling-



step, was the use of a horizontal and a vertical milling spindle which permitted a light milling operation to be combined with drilling and tapping. The purchaser expects that the machine will pay for itself in less than 9 months.

The operations performed are as follows:

Needle valve (¼″ in diameter, 11 different lengths ranging from 2½″ to 4½″.) (1) Hand load 1 piece per stroke. (2) Automatically clamp. (3) Drill No. 36 hole 11/16″ deep in 2 steps in the end of the valve opposite the needle. (4) Countersink to 7/32″ dia. x 25° included angle. (5) Mill .035″ slot 11/16″ deep down the center axis of drilled hole. (6) Tap No. 6-32 NC-2 9/16″ deep. (7) Automatically unclamp. (8) Hand unload (to protect needle points). Production—750 pieces per 50 minute hour.

High speed nozzles (7 different parts with 1 to 3 metering holes at various locations and of different diameters.) (1) Hand load 1 piece per stroke. (2) Automatically position and clamp. (3) Drill meter holes. (4) Mill 1/16″ slot 1/16″ deep. (5) Automatically unclamp. (6) Automatically eject. Production 30 strokes a minute or 1500 pieces per 50 minute hour.

Float valve seats (4 different parts with variation of seat I.D.) (1) Hand load 1 piece per stroke. (2) Automatically clamp. (3) Combination ream 2 diameters in I.D. holding concentricity of .004″ T. I. R. (total indicator reading) with clamping diameter. (4) Rough and finish face the valve seat, holding depth tolerance of .005″. (5) Mill 3/64″ slot 1/16″ deep. (6) Automatically unclamp. (7) Automatically eject. Production—1100 per 50 minute hour.

Tooling and spindle layouts are designed for maximum interchangeability to facilitate rapid change-over from job to job. For instance, change-over from Needle Valves (requiring the vertical milling spindle) to High Speed Nozzles (requiring the horizontal milling spindle) entails a complete change of dial and ring, and takes only about 2 hours. On the other hand, converting from one length of needle to another length requires simply changing a set of spacers and can be accomplished in about 15 minutes.

Wire rope cutting without unraveling

Abrasive cut-off wheels have solved another of industry's difficult cutting problems. Wire rope can be cut without deforming or unraveling the individual wires with the Norton reinforced resinoid wheel. A piece of wire rope shown in the accompanying picture is being set up for cutting in a 10 h.p. DeWalt cutting-off machine. The wheel is a Norton 16x5/32x1″, A24-V1OBN resinoid Norflex, operating at 3425 rpm.

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UP-ACTING FORMING PRESS

This new Rodgers Hydraulic Up-acting Platen Press is designed to meet *all* requirements of your plastic, rubber or metal forming jobs. This press has a 100-ton capacity and 30"x 30" platens—an adjustable ejector accessory unit speeds up the cycling rate. Other Rodgers accessory units adapt this press to your every need. Automatic electro-hydraulic control system governs platen pressure, movement and cycling on production runs of any length.

DRAWING PRESS WITH DIE CUSHION

New 400-ton, 48"x36" drawing press is equipped with 70-ton die cushion, die mounting and bolster plate. Auxiliary cylinders provide fast lowering and retraction of platen—a big time saver!
Rodgers electro-hydraulic system controls platen movement, platen pressure, and time cycles for short or long production runs. You'll increase quality and boost production rates of your metal drawn products with this new Rodgers Hydraulic Drawing Press.

IF YOU'RE PROCESSING METALS AND PLASTICS you'll be interested in these presses; let us send you more information and also a copy of our catalog describing other Rodgers "Blue Ribbon Presses" for plastic and rubbermolding, metal drawing and metal forming.

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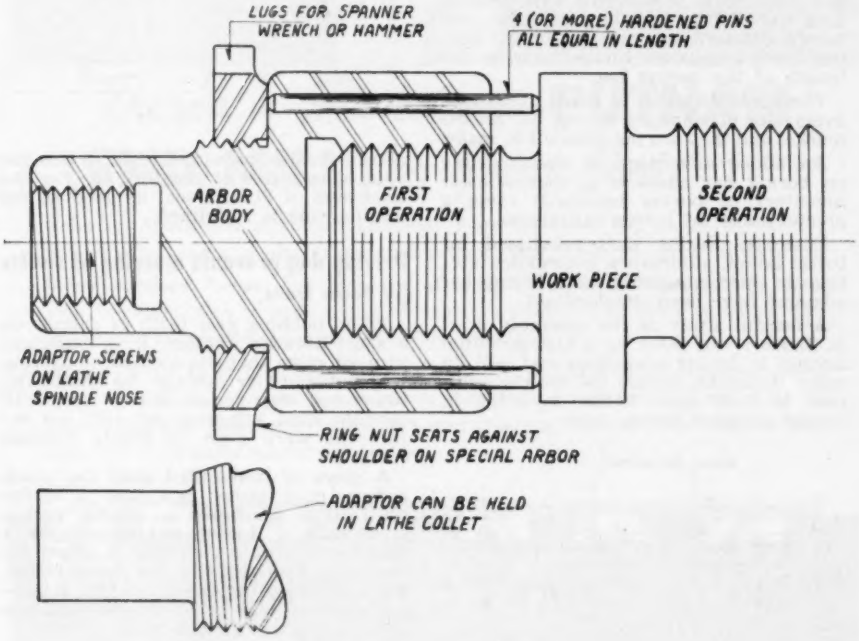
Shop HINTS

Quick releasing internal threaded adaptor

by **H. J. Gerber**

Recently, a small quantity of machine parts, threaded at both ends, were tooled up for turret lathe production. After threading the first end, an attempt to chuck for the second operation was made by screwing into a one-piece threaded adaptor held in the spindle of the lathe. Due to the "tightening on" effect of the second operation machining, it was found that the pieces were difficult to remove and were often damaged in the removal process. The illustrated special adaptor was built to permit immediate and effortless release of the finished pieces.

A shoulder was turned and threaded on the left hand end of the adaptor body. A threaded ring nut was screwed on this thread. The body was drilled and reamed longitudinally for four hardened tool steel pins. These pins were made long


LUGS FOR SPANNER WRENCH OR HAMMER
4 (OR MORE) HARDENED PINS ALL EQUAL IN LENGTH
ARBOR BODY
FIRST OPERATION
SECOND OPERATION
WORK PIECE
ADAPTOR SCREWS ON LATHE SPINDLE NOSE
RING NUT SEATS AGAINST SHOULDER ON SPECIAL ARBOR
ADAPTOR CAN BE HELD IN LATHE COLLET

enough to contact the collar on the workpiece and the side of the ring nut when the ring nut was up tightly against the shoulder of the adaptor. These pins prevent the collar on the workpiece from seating against the outer face of the adaptor, as was the case on the original adaptor. The pins should be ground off to exactly equal length in order to squarely position the work when it is screwed tightly against them.

To release the work is simply a matter of striking the lugs on the ring nut with a light blow from a hammer. This releases the axial tension against the work and permits instant removal by hand.

There are other methods of accomplishing this same job but for accuracy and simplicity, this appears to be the best one.

Boring bar adaptor

by **Harold D. Rhodenbaugh**

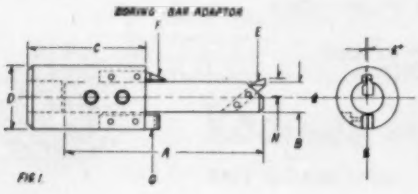
Figure 1 shows a standard boring bar mounted in a boring bar adaptor designed to face and chamfer in conjunction with the boring operation. This is a production tool. It is a standard tool because both the adaptor and the boring bar will accept standard cataloged tool bits. Boring depth ranges are limited only by the length of the boring bar.

These adaptors can be made up to take every size of standard boring bar on the market and they are not difficult to make.

An added advantage in standardizing on boring bar adaptors is that a lower inventory of boring bars will cover a greater range of boring operations.

Example: Boring bars purchased for turret lathes, automatics, borematics, etc., become interchangeable when boring bar adaptors have been standardized.

A careful study of the assembly print in figure 1 will point up a high potential savings in boring operations and will, in many instances, induce the tooling engineer to look again before investing in special purpose boring tools.



Carbide boring tools salvage

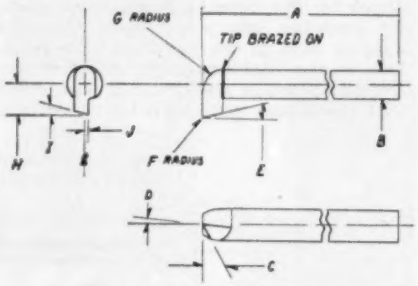
by **Hubert Stankey**

The high cost of solid carbide boring tools makes it prohibitive to discard the shank after the working area of the tool has been exhausted.

The cost of stocking and maintaining these tools can be greatly reduced by setting up a salvage procedure. Figure 1 shows a salvage print used by a midwestern plant that automatically insures economy in the use of this type of boring tool.

Here is an example: The approximate original cost of the last Carboloy boring tool shown in the tabulation—½" dia. by 7¼" length—is $92.

By selecting a standard 5/16" dia. by ¾" length Carboloy blank tip at an approximate cost of $2.50 and bracing it on the end of a solid carbide bar, an expensive tool is reclaimed. Add to this the approximate cost of grinding, $5. For the total sum of $7.50, a tool as good as the original one is reclaimed.



Driving dog prevents marring of shafts

by **Roger Isotts**

When hobbing gear teeth or splines on a shaft between centers, it is important in most cases that the method of driving will not mark or damage the shaft. The illustrated dog design shown here will provide rigid gripping, yet will not injure the work even on highly finished surfaces.

A piece of cold-rolled steel flat stock is bored and reamed to a close fit on the shaft. It is machined as shown and a cross hole is drilled and tapped for a clamp screw. It is then split to allow for clamping. By tightening the clamp screw, the dog will spring enough so that clamping pressure will be exerted around the entire periphery of the work.

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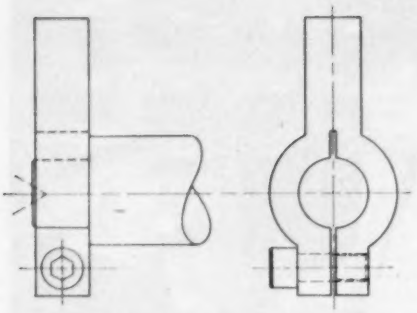


To save loading and unloading time, two dogs should be made. Then the operator can be attaching a dog to a new piece while the machine is running.

Undercut and grooving tools

by **Albert Chisal**

In the manufacturing of aircraft instruments there is an ever-increasing need for controlled application of O.D. undercut and grooving tools. Even though these tools are of simple design, their close tolerances and their limited grind life makes it impractical to depend on the job of grinding.

It has been found to be advantageous to design and control these tools per tabulated sketch or print. See figures 1 & 2.

These are right O.D. undercut and grooving tools for use on lathes and are standardized to company requirements. It may be noted that the primary difference in these tools is on dimensions A and H.

After the tool style has been sketched and tabulated, the creation of new tools to the same style is comparatively simple. Write in the critical dimensions and add one digit to the identification number.

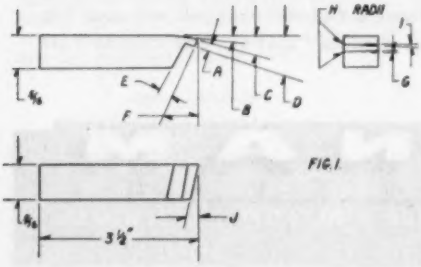


FIG. 1

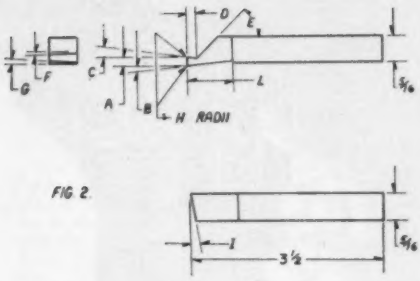


FIG. 2

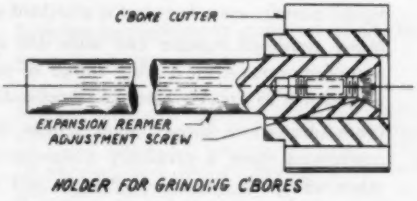
Expansion arbors from scrap reamers

by **George Spasink**

Worn-out expansion machine reamers can be utilized as arbors for grinding the faces of B & T counterbores. An ideal expansion arbor is produced by grinding the outside diameter of the reamer to fit the hole in the counterbore and cutting off part of the shank of the scrap reamer.

The expanding screw of the reamer can be turned to expand or contract and thus take up any variation in hole size of the counterbore. This method holds the counterbore rigid at all times, enabling the operator to grind all faces flat and square.

The reamer shank of the expanding arbor can be held in any standard draw collets during this cutter grinding operation. By looking through the perishable tool scrap box, many different sizes can be salvaged for use as expansion arbors.

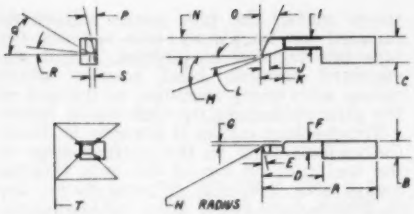


HOLDER FOR GRINDING C'BORES

Tool development pays off

by **Otto Hincke**

Today, as never before, the manufacturers of metal products are facing up to tool development requirements. This is due largely to the introduction of more and more variation in the manufacturing



of metal alloys. Coupled with this is an ever-increasing demand for closer tolerances and finer finishes. Consequently, cutting tool application is becoming more specialized, more technical.

It is no longer possible to just call out a standard turning or boring tool on an operation card and feel sure that it can be made to do the job. With all the different quality classifications of metals listed and with all the recommended grades of carbides charted to machine these various metals, there is still the unknown factor to contend with in cutting tool application.

It follows, therefore, that a method of tool development must be considered.

Figure 1 shows a tool development chart blank through which a boring tool bit is introduced to a specific application in the shop.

The tool blank and the development blank filled out in red pencil go from the cutter grinder department to the shop together. The tool is tried on the job. Any necessary alterations are red-pencilled in on the line down from the original tool line. As development proceeds each alteration is recorded, step by step. This takes the guess work out of tool development and records changes so they will not be repeated. When the tool produces satisfactorily, the tool development sketch is recorded for future reference. If more technical development is required at a later date, it may be accomplished by recording the data on a tool history card.

The tool development print is used primarily to start production rolling.

Tool development print blanks of every style of standard tool used facilitate tool development in the shop, since they can readily be filled in by the engineer or tool tryout man. He doesn't have to draw a sketch or spend valuable time explaining verbally what he wants done to a tool and he always knows what has been tried.

Oil level sight gauge

An inexpensive oil level sight gauge has simplified the checking of cutting oil tanks on high speed routers and drills at Temco Aircraft Corp.

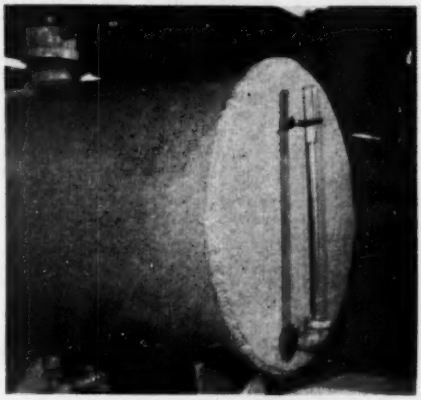
The sight gauge also has reduced both machine down-time and a recurring threat to safety. Re-filling cutting oil tanks on 13 radial arm routers and drills and overhead pin routers formerly was a tedious job.

The department oiler's only means of checking was to remove the oil tank filler cap and squint inside the tank with the aid of a flashlight. To do this, he first had to stop the machine and climb up on its oil-slicked table.

Each machine's five-gallon oil tank normally is drained in one full day's operation. To keep up with 13 machines, operating irregularly, the oiler made five to 10 tank-checking circuits a day.

The sight gauge suggestion, which works only on machines with a gravity-feed oil system, came from a department electrician, G. W. Patridge.

It consists of an upright nine-inch plexiglass tube connected to the bottom of the tank by a small elbow joint. Oil stands at the same level in the tube



as it does in the tank. Each gauge is mounted at eye level, and all 13 can be scanned from the department aisle.

Now the oiler climbs a machine only when its oil tank needs filling. A bargain in cost at $1.50 apiece, each sight gauge paid for itself in manhours saved just two days after it was installed.

Keep the coolant on the tool

by **Harold D. Rhodenbaugh**

One of the outstanding contributing factors to tool breakage in the carbide group of tools is coolant application.

It is an accepted premise that the application of coolants to carbide tipped tools does not necessarily contribute to the life of the tool. However, the application of coolant is a deciding factor in heat control on the part being machined, especially where close tolerances are to be maintained. This is true with the nonferrous metals.

When coolants are used with carbide tools, the tools should be flooded profusely while the tools are cutting. Allowing the coolant to splash on a hot carbide tip or tool will cause the carbide to check and/or crack.

Most modern machines have coolant pumps and pipe lines controlling the flow of the coolant, but in many cases the time required to adjust the line into position is time-consuming. In such cases the machine operator is depended upon to guide the coolant to the tool by hand. This is especially true of the back tool on the cross slide of a hand screw machine.

Figure 1 demonstrates an effective method of directing the coolant to the back cutting tool on a hand screw machine. The rubber hose, 18" long, is connected to the cross-slide coolant line with a coupling adaptor as shown. The other end is adapted to a piece of pipe that is anchored to one corner of the back tool post by means of a 1" square block held in position by a ¼" allen screw. A set screw makes the pipe easily adjustable forward or backward and secures the pipe into the desired position. Attach the standard flexible steel nozzle, which comes with every machine, to the end of the pipe projecting through the 1" block.

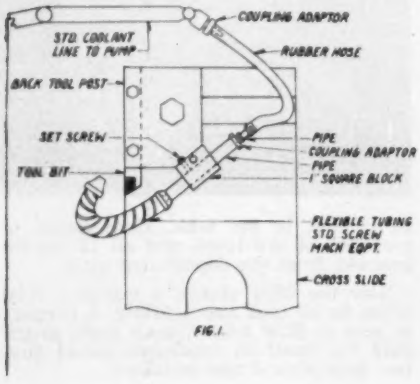


FIG. 1

This hookup makes it possible to direct the coolant flow to the cutting edge of the tool (not on top of the chip flowing away from the tool). Furthermore, the possibility of human error or negligence is minimized because the coolant line travels with the carriage and it will stay put.

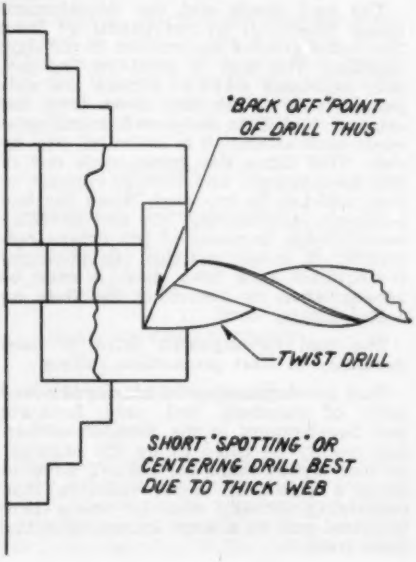
Modification of a twist drill for single point boring

by **H. J. Gerber**

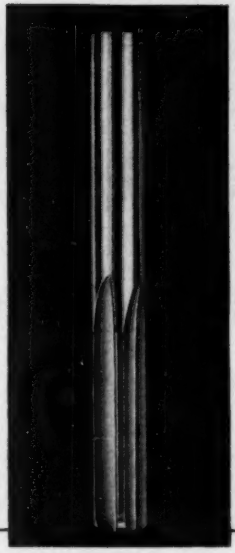
When a small diameter boring bar is unavailable use an ordinary twist drill for single point lathe boring of small holes and counterbores.

The drill point is simply backed off and shaped as illustrated. Only the extended corner of one cutting lip is in contact with the work. The helix angle of the flute will provide ready made positive rake to the cutting edge.

The short, thick webbed drills, such as "stove burner" or "center spotting" drills, are best for this purpose due to their greater thickness of web and consequent greater rigidity.



ATRAX
IN ACTION



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A CASE HISTORY: One of our Mid-Western customers has reported a comparison performance of a Solid Carbide Reamer versus a Tipped Type Reamer in Stainless Steel. The Tipped Type Reamer produced egg-shaped holes with poor finish which did not pass inspection, and production obtained was very low. When **ATRAX** Solid Carbide Reamers were put into use, the first reamer used produced 1,800 holes. *Each hole was absolutely round and the finish obtained was exceptional!* Although the cost of the Solid Carbide Reamer was approximately twice that of the tipped reamer, the end results obtained were not comparable since the tipped reamer could not produce satisfactory holes on a production basis.

This is one of a series of factual cases. Possibly our engineers or sales representatives can help YOU achieve similar savings. You'll find them in all principal cities, ready to consult without any obligation.

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Foremanship Forum

"Conditions" Are Important

By **George Allison,** Management Consultant

A COMMON and potent word used by workers is "conditions." But it is one that is rarely used by management and personnel people.

This word warrants consideration for it is a word that could easily block the most sincere effort to achieve good labor relations, or may foster good labor relations when many other contributing factors are missing.

The keystone of labor-management relations is the conditions under which a worker performs his daily duties. Conditions may be physical, mental, or psychological in nature, and have little to do with such things as contractual relationships, wages, hours of labor, etc. Their influence on a worker's attitude may originate in the plant or outside in the worker's personal and family life. But regardless of their nature or origin, "conditions" represent the aggregate much more than just a personal factor; they constitute a production force of a great deal of consequence.

During the great effort of the war years the importance of conditions to plant output was never better exemplified. Employment opportunities were at a maximum and high wages were the rule. Organized labor reached a new zenith of power and contractual relationships were never more favorable to the worker. However, what was the factor that repeatedly determined the choice of the worker in taking a job? Conditions!

Conditions which included conveniently planned work shifts, availability of good food, rest and recreation facilities, rest periods, music piped to factory workrooms, clean, light, and airy plants, adequate bench space, intelligently friendly supervision, and many other like attractions acted like magnets to draw the most desirable workers from the labor pool.

A plant's reputation, bad, good, or indifferent, working conditions, is soon passed around by the workers to those in other plants. And the best workers will go where conditions are best.

Today, production must be efficient to be profitable and working conditions must be good to inspire the greatest labor productivity and efficiency.

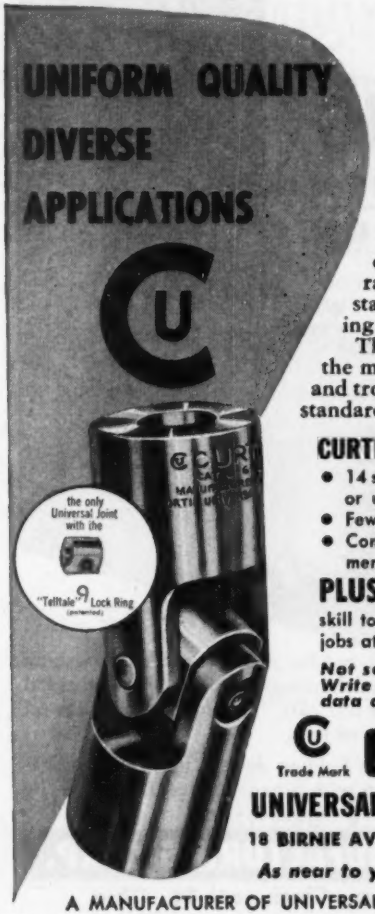
Management provides the physical conditions with which the worker spends half his waking life—a workroom, machines, tools, benches, light, etc. These physical conditions are important, and the worker's happiness and efficiency are often in direct ratio to

the physical conditions under which he works.

Grievances fade when workers are assured the boss is a "good guy." The worker who has a gripe feels good about his job when he knows that within reasonable limitations his gripe will be heard and considered.

The supervisor or foreman is the link between management and worker. He can often wreck the best working conditions or improve the worst. This fact is reflected in production reports, cost records, and earnings and statements. The supervisor may be one of the most valuable assets of a company or one of its greatest liabilities.

One old-time shoe factory foreman had his own remedy for gripes. He kept a nursing bottle in his desk as a "labor management aid." Every time he heard one of the boys "crying" about some-



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thing, he offered no comment, but placed the bottle quietly on the worker's bench. The gesture was always good for a general laugh and the gripe was invariably forgotten. At the moment, that worker's grievance was probably an inconsequential thing, but such inconsequentialities can develop into major plant disturbances.

Now that production has been decreasing and unemployment has risen due to cutbacks and layoffs, the problem of handling the worker with a gripe is commonly receiving less attention. Instead, he should receive more. A good workman is more than a statistic. He is human. Conditions which affect his sensitiveness and temperament contribute greatly to his skill and proficiency, his enthusiasm and loyalty, and the other things which are a vital part of profitable production.

DO

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AND A ZILLION

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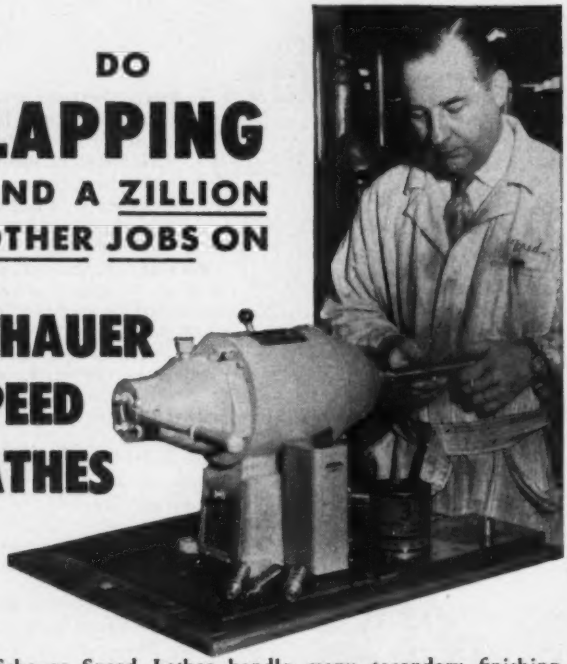

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Speed steels are produced by W. J. Holliday & Co., Inc., Speed Steel Plate Division

A man may fear losing his job in a day when jobs are harder to find, but he also may have a gripe that affects his usefulness and productivity. And the disputes and strikes that grow out of accumulated petty gripes are costly.

One often told story is about a company which suffered a three-month strike that cost it well over a million dollars, just because no one had bothered to straighten out a gripe from a worker who didn't understand a new payroll basis and thought the company had cheated him out of $17.

Groups of workers form attitudes toward management largely on the basis of their personal feelings and prejudices. Management cannot afford to overlook the fact that the basis for most of the friction, discontent, gripes, and disputes in a factory results simply from the way

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"BEAR"
STATIC AND DY-NAMIC BALANCING MACHINES

workers feel about conditions surrounding them.

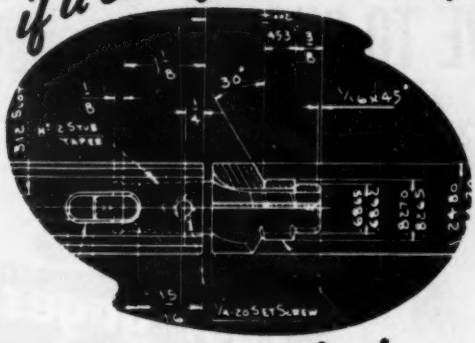
A gripe may be real. It may be imaginary. In any case, the worker feels he has a grievance and his immediate problem must be handled as such.

When a worker gripes, he usually takes it out in one of four ways:

1. He complains openly in words.
2. He does his work less effectively.
3. He may sometimes adjust himself satisfactorily without aid.
4. He may worry and brood silently until the matter becomes an obsession with him.

Whether the gripe grows into a grievance, and where it eventually leads, depend largely upon the supervisor. Depending upon whether the gripe gets to the supervisor, the union representative, other workers, or the front office,

if it calls for Specials...



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Turn troublesome, costly "special" hole production jobs into smooth-running, high-performance operations by taking your problems to Staples Special Tool Design and Engineering Service.

Leaders in the field of circular carbide-tipped tool manufacturing, Staples' expert tool engineers can meet your most rigid specifications with special tool designs that will speed your production and deliver precision results, while reducing your tooling costs.

A brief description of your job requirements will bring a prompt response.

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Staples CARBIDE-TIPPED CUTTING TOOLS

A complete line of Standard Circular Carbide-Tipped Tools, Expansion Reamers

a variety of things may happen.

Sometimes the gripe exists for a long time without being made known or being recognized by management. This may be due to lack of proper relationship between worker and supervisor, the worker's fear of losing his job by complaining, or a naturally sensitive nature. In any case, an unexpressed gripe is always a serious threat to good plant relationships and uninterrupted output. The emotions of the worker react upon his thinking, and eventually the gripe turns into a grudge and then into a dispute.

Several techniques have been developed through trial and error for handling gripes which may be adapted to meeting individual situations.

1. Get the worker's viewpoint, and be considerate of it whether it be real or imaginary. This convinces him that

Detroit thread plug and thread ring gages have long been noted for their high degree of accuracy and long life.

Now, in addition to accuracy and quality, Detroit Tap and Tool can make prompt delivery on Standard American National thread gages as well as on gages for Unified threads, American Standard pipe threads, Aeronautical pipe threads or Dryseal pipe threads.

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. . . CIMCOOL° COOLS SO FAST *that workpiece, tools and chips actually stay cool to the touch!* With this radically new and different cutting fluid on the job, there is no need for gloves, no need to cool the workpiece before removing it from the machine.

And there are other reasons why CIMCOOL scores with operators. This revolutionary cutting fluid—this *chemical emulsion*—virtually eliminates rancidity and foul odors. Can't burn. Can't smoke. Doesn't soil hands or clothes and contains no skin irritants. And leaves no hazardous slippery film on the hands, machine, workpiece or floor.

Let us show you how CIMCOOL can put your plant in the winning column. We'll be pleased to demonstrate—on your own machines—how CIMCOOL *makes jobs better . . .* and *does a better job.* Just write us and we'll have one of our Cincinnati Milling-trained machinists call on you—without cost or obligation. Or, if you prefer, write for our free booklet, "Cimcool Defeats Heat." Address Sales Manager, Dept. B-114, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

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CIMCOOL

A PRODUCTION-PROVED PRODUCT OF THE CINCINNATI MILLING MACHINE CO.

you are trying to be fair.

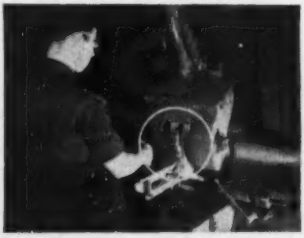
2. Remain calm and objective. Make it easy for the worker to state his case and for you to get the whole story and determine the root of the trouble. The "problem-solving approach" keeps the conversation on a basis of a friendly discussion.

3. Get all the facts before attempting any solution. This prevents accidental unfairness to other employes and also gives the worker a chance to talk himself out of his gripe with no assistance from you.

4. Save his face. It is essential for the complainer to preserve his self-respect. It will also encourage him to come back again if he is dissatisfied. Never humiliate the worker, especially before his fellow workers. He will never forgive you for it and neither will they.

5. Be prompt in reaching a decision.

Norton covers the disc grinding range



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"TOUCH of GOLD"

Whatever your disc grinding requirements may be, Norton will meet them exactly — with discs engineered for coolest cutting action and longest, most productive service life.

Norton discs of ALUNDUM* and CRYSTOLON* abrasives are made in five types of bonds and all types of mountings. They are precision-built, for closest uniformity of grinding action from disc to disc and lot to lot. Which means you can always depend on getting the same top performance — next week, next month or next year.

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This convinces the worker of your interest in his welfare. However, don't make snap judgments and hasty promises. They may blow up in your face.

6. Avoid using the force of your authority to effect a settlement. The problem-solving approach of mutually working out an answer makes the worker feel that the final decision is partly his own.

7. Avoid hedging or passing the buck to superiors or other supervisors. The worker came to you. It is your responsibility to help him if you can.

8. Convince the worker that you have been honest and sincere in considering his problem, and that you are willing to join him in taking it to higher authority if need be. That will seldom be necessary, but it protects you both and improves respect for each other.

It is well worth remembering that the human element is always the greatest single factor in industrial "conditions" that encourage gripes or inspire tranquility.

The End.

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NELCO TOOL CO., INC.
MANCHESTER, CONN

A special report
by the editors of
MACHINE and TOOL
BLUE BOOK

Report number 43

Presses . . . part 5

This is the forty-third in a monthly series of special reports discussing various types of machine tools. Included in this month's special report on presses are:

1. **Carbide dies and punches in stamping operations.**
2. **Descriptions of late model presses.**
3. **Specifications of American-built machines.**

Previously published reports discussed: 1. Thread Rolling; 2, Power Press Brakes; 3, 4, 5. Milling Machines; 6. Honing, Lapping and Superfinishing; 7. Automatic Screw Machines; 8. MAPI Replacement Formula; 9. 10. Chucking Machines, Turret Lathes, Hand Screw Machines; 11. Broaching Machines; 12. Shapers, Slotters, Keyseaters; 13, 14, 15. Lathes; 16. Planers; 17. Gear Making Machines; 18, 19. Boring Machines; 20, 21, 22, 23, 24, 25, 26. Drilling Machines; 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38. Grinding Machines; 39, 40, 41, 42, Presses.

Carbide dies and punches provide maximum economy in forming, piercing and blanking operations

DURING the past few years, the increasing use of cemented carbides for cutting tools has been so spectacular that it has somewhat thrown into eclipse the more gradual—but equally important—development of carbide as a die metal. Nevertheless, the application of carbides to dies has completely changed industry's ideas of speeds and costs.

Use of carbides has also materially increased the life of dies in punching and blanking operations and other applications.

Hard cemented carbides made their first commercial appearance in Germany during the First World War. Carbide metal was then used as a substitute for non-obtainable diamond dies for drawing fine tungsten wire. The first use of cemented carbide in this country was also for wire drawing dies.

Blanking Dies

Carbide blanking, piercing and notching dies for sheet metal in both light and heavy gages, have established production records of millions of superior

---

Material through the courtesy of the Carboloy Department of General Electric Company.

Due to the long life potential of carbide dies, it is important that they be properly aligned and rigidly mounted in their shoes and cases and in the press. All of their advantages can be offset by failure to insure proper alignment and maximum rigidity in mounting.

quality pieces from one set of blanking dies.

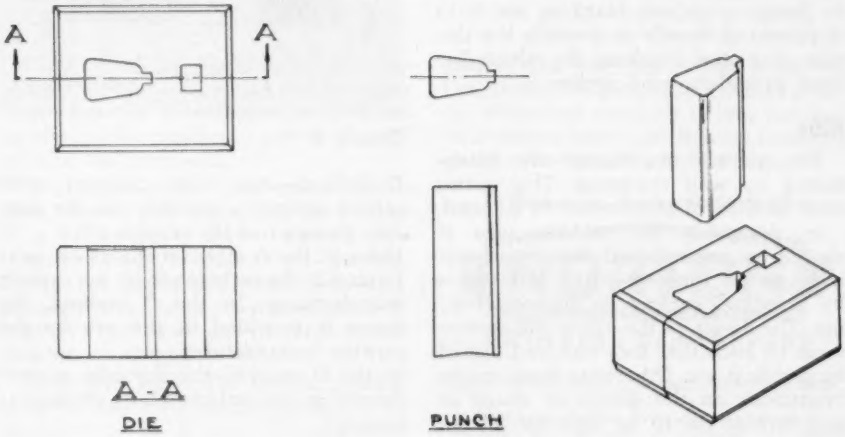
Comparative die life on many applications, such as electrical parts and motor laminations, has been from 20 to 40 times that of steel punches and dies.

Better quality laminations are produced with carbide dies, since laminations produced on carbide dies are free from burrs over a longer period of die life. Less downtime of presses for die servicing also results in increased production.

At this point, it should be clearly understood that a carbide blanking or piercing die does not necessarily produce a better product than a similarly properly designed steel die—during the first part of the run on the steel die.

An eastern factory provides a typical instance of lamination die practice where laminations are punched out of sheet metal at single step index machines in the manufacture of stators for electric motors. This particular application is unusually severe in that sheet metal—although only .016" to .018" thick—contains 2.50 per cent silicon and .12 per cent carbon and in addition is given an annealing treatment which forms a tight scale on the steel. This scale is said to have valuable electrical insulating properties, but it is also extremely abrasive. The carbide dies used in this operation are made in two halves and are clamped together so that the die can easily be dis-assembled for regrinding. The carbide punch has a taper towards the center which tends to give

These carbide stator laminating dies are so designed that the dies can be easily taken apart for regrinding. The punch has a taper towards the center which tends to give the punch more shear, thus providing a freer cutting action and greater punch life. This die is estimated to last as much as 50 times longer than similar sets made of steel on identical operations.



the punch more shear, thus providing free cutting action and greater punch life.

The dies and punches formerly employed for punching these stator laminations gave an average of 46,000 punches before regrinding became necessary. The carbide punch and die sets have produced as high as 2,300,000 pieces between grinds. And the laminations produced with the carbide sets are free from burrs.

Die Design

Good blanking dies with carbide nibs are not difficult to design or produce. General practice is to design round hole dies for blanking "cookies" with a one-piece circular carbide nib, while blanking dies used to produce irregular shapes are either of split or of segment construction.

Nibs for blanking dies can be furnished in virtually any desired shape. Recommended practice is to use heavy nibs for blanking dies and hold these rigidly in place by mechanical holding methods. Using thicker nibs also means that there is additional stock for a large number of regrinds, thereby further multiplying the already far longer life of the die or die set.

The simplest and most effective way to design a carbide blanking die is to duplicate as closely as possible the design of a steel blanking die which has been providing good service.

Nibs

Nib outside dimensions are determined by wall thickness. This varies with method of attachment to be used.

In designing the carbide nibs it should be remembered that these will have to be finished—after sintering—by grinding, lapping or diamond boring. The design of the nib or nib section must be such that they can be finished by grinding, etc. Otherwise there are no limitations on the design or shape of any carbide die to be used for blanking, piercing or notching.

It should also be pointed out that there are no oxides on the surfaces of carbide nibs, therefore it is not necessary to remove more than a "skin" coat to obtain a good finished surface.

There are four methods of mechanically attaching carbide nibs in the shoes of blanking dies.

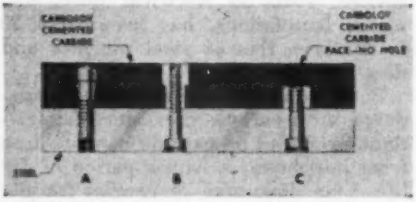


Figure 1:

A-Method—counter-bored and drilled hole preformed in the carbide nib to accommodate a cap screw.
B-Method—through hole pit in carbide nib by the Carboloy department to take tapped section furnished and inserted by user. Tapped section is anchored to resist rotation.
C-Method—Insert in carbide nib for blind hole.

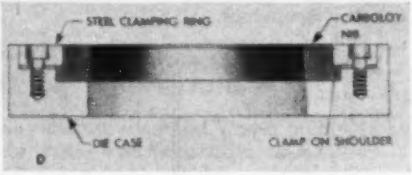
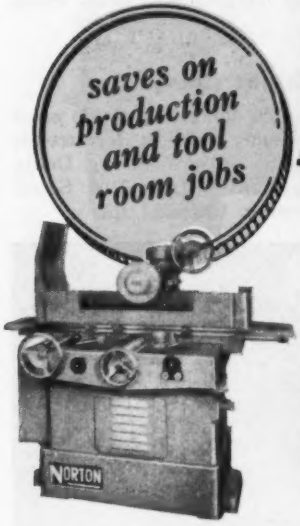


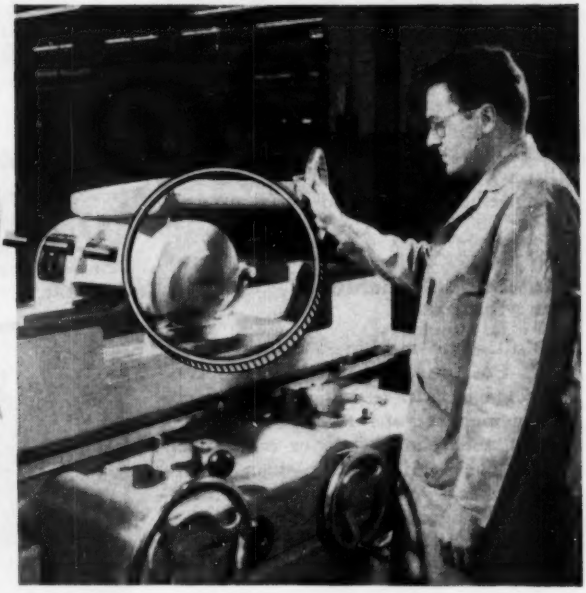
Figure 2:

D-Method—steel ring clamped with screws against a shoulder on the outside diameter of the carbide nib.
Holes in the A and B methods are preformed in the carbide nib by the carbide manufacturer. In the C method, the insert is provided in the nib by the carbide manufacturer.
In the D method, the shoulder is preformed on the carbide nib by the manufacturer.

Easy to set up... Easy to operate...

This Norton 8"
Surface Grinder





Here's a rugged machine that sets up quickly for production runs and maintains steady accuracy on small parts. And it's just as efficient for grinding a variety of small units in tool room work.

Designed with both hand and hydraulic table traverse and cross feed, the Norton 8" x 24" hydraulic surface grinder produces plane surfaces smoothly and speedily. Convenient controls and easy accessibility keep operating and maintenance time low — while the quick, easy set-ups cut your unit costs on job after job.

Write for Catalog 190 on this popular, money-saving Norton surface grinder, or for literature on its 6" and 10" companion models. And remember — only Norton offers you such long experience in both grinding wheels and machines to help you produce more at lower cost. NORTON COMPANY, Machine Division, Worcester 6, Mass.

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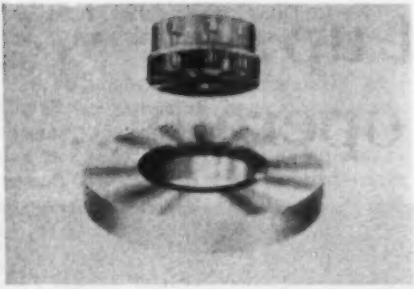


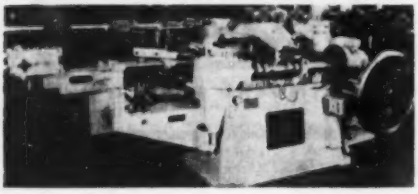
Figure 3 shows method C as it is applied to blanking punch. There are no through holes in the carbide nibs with this method since "blind" holes are used.

Multi-slide machines for stamping

Multi-slide machines, made by U.S. Tool Co. Inc., Ampere, N.J., are constructed in four sizes. Standard equipment includes one ram, four forming slides with cams, stripper mechanism, slide feed unit, stock straighteners, stock check, brake, automatic lubrication system and variable speed drive. The horse power varies with the size of the machine.

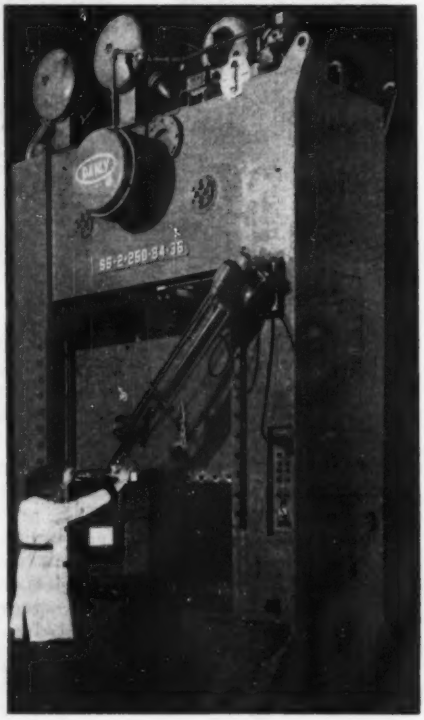
The U.S. Multi-Slide machine is a horizontal unit with the motions of the ram and forming slides in the horizontal plane. Because the motions of these units are in the horizontal plane, the material itself is fed into the machine on its edge in the vertical plane.

Many different types of complicated formed stampings can be produced on this machine in one operation. The multi-slide is simple in operation. A shaft system completely surrounds the bed of the machine. Power is applied to the cam shaft system through gears and belts. By means of suitably designed cams and eccentrics the horizontally operating slides, beeding mechanism, embossing heads, etc., are actuated from the shafts. Smooth starting is accomplished by means of an ajustable friction clutch, no gears being disengaged.

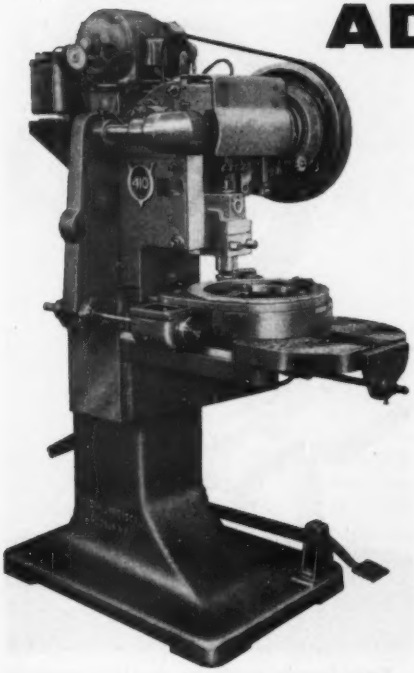


Danly straight side press

The Danly 250-ton straight side press incorporates many of the modern trends in press design. It is made by Danly Machine Specialties, Inc., 2100 South Laramie Avenue, Chicago, Ill.



PRECISE, STURDY, ADAPTABLE



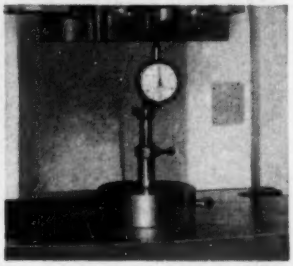
The V & O Notching Machine is so high in precision that it qualifies as a machine tool.

Because they are built like machine tools, V & O presses maintain precision throughout their operating strokes, are sturdy for trouble-free endurance, and are adaptable for clever tooling and for automation. With V & O presses you can safely use higher-cost tooling, depend upon higher precision production, and reduce costs with automation.

V & O was born for solving the problems of press automation. We have specialized on automation for 65 years. The full story is yours for the asking.

WHY THE V & O LONG SLIDE PROVIDES BETTER ALIGNMENT

With the same running clearance, the longer the slide the less the possibility for angular misalignment. And we keep our running clearances very close indeed.



Square and parallel within .0005" on a 4" stroke, is an ordinary V & O specification. Finer specs. if you need them.

THE V & O PRESS COMPANY

DIVISION OF EMHART MFG. CO.

HUDSON, NEW YORK

BUILDERS OF PRECISION POWER PRESSES AND FEEDS SINCE 1889

Accessories include dual air valve, oil pressure safety switch, adjustable press control unit, rotary cam limit switch and air control manifold. All pneumatic and electrical controls have been built into compartments in the press frame.

Many of the floor level items have been recessed into the press to prevent scuffing the operator and to avoid damage to the press from material handling equipment.

Turret type punch press

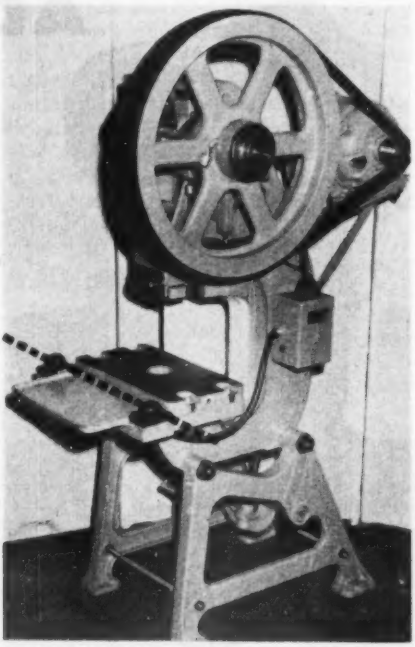
Turret type punch press, made by the Rotex Punch Co., Inc., 2350 Alvardo Ave., San Leandro, Calif., is a new model, 18-B, with a 24" throat depth.

This rotary turret punch has 18 stations and punches any shape hole. The

desired punch-and-die set is brought into position instantly by a rapid, manual turn of the turret, then locks into alignment. Punch and die sets can be made to designs or are available in round or irregular shapes and sizes up to 2" in diameter. Punches metals, plastics, cardboards, fiberboard, leather and other sheet metals.

Attachment for presses with mechanical clutches

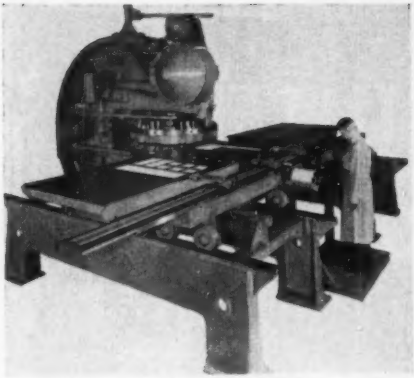
Perkins Machine Co., Warren, Mass., has developed a dual push-button solenoid operated trip attachment for presses with mechanical clutches.



Two hands must be on the controls when the press is tripped. Both buttons must be pushed to trip the press, and both buttons must be released to again trip the press. This prevents an operator from beating the safety attachments by use of rubber bands, sticks, elbows or other means. A reset mechanism is actuated by back contacts of push buttons, requiring definite use of two hands by the operator. The attachment shown in the accompanying picture, is attached to a Perkins 20-ton capacity press.

Turret punch presses eliminate punch and die changing

Work locating and punching problems, and punch and die changing are eliminated by Weidemann Turret Punch Presses, made by Weidemann Machine



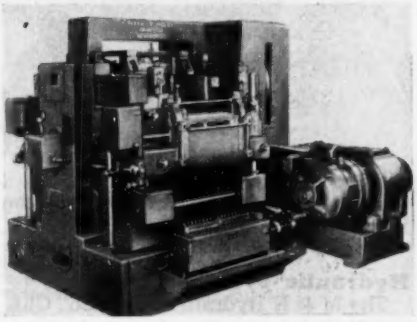
Co., Philadelphia 32, Pa. They are designed to locate and punch small sheet metal jobs to the largest plates.

All the necessary punches and dies for most jobs are carried in the turrets at one time, and are quickly brought into piercing position by rotating the turrets. The same tools can be used for many jobs, and the wide variety of punches and dies in the press provide maximum operating flexibility without setup. If necessary, punches and dies can be changed in 1.5 minutes or less for each station, and no special skill is required. This speed is due to quick-change and self-aligning die holders. as well as the punch holders which facilitate rapid and accurate replacement of punches and dies without special tools.

Super speed press

A most useful and interesting development in progressive die machines is the new Super Speed Press, made by Ferracute Machine Co., Bridgeton, N.J. This machine features high speed and accuracy of operation together with maximum durability. It includes a horizontal bed or plate on which the die is fastened and which is horizontally reciprocated by an eccentric driving crank. The horizontal movement of the die is in the same plane and direction in which the work strip is fed. The press ram to which the punch holder with its punches are attached is reciprocated vertically by the same crank movement that oscillates the die.

The press reciprocates the die rapidly forward and backward coincident with the feeding direction of the work strip while the cutting members are rapidly opening and closing or biting into the strip. The strip passes uninterruptedly through the die while piercing and blanking operations are being performed at each downstroke of the crank. The number of press strokes may be

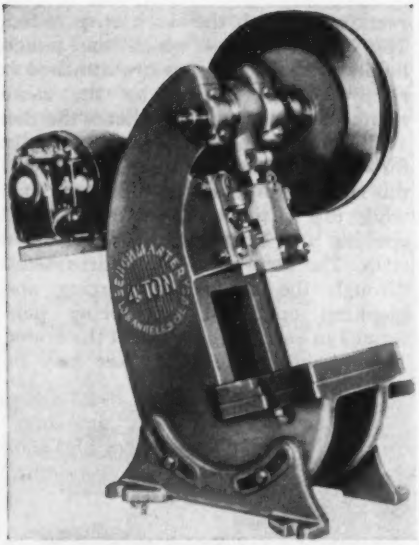


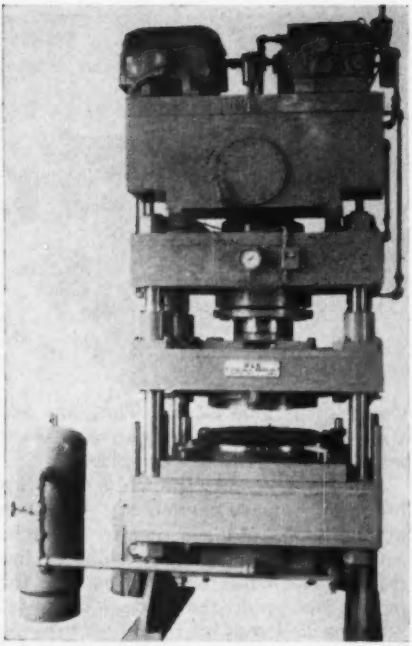
1,000 per minute when fabricating small, simple parts; however, the press speed can be reduced while the ham is in operation by a simple control for handling different parts or for performing more difficult work.

Inclinable punch press

The Benchmaster, 7½-ton standard open-back inclinable punch press, made by Benchmaster, 1835 Wó Rosecrans Ave., Gardena, Calif., now is used for stamping, forming, punching, marking, rivetting, staking, shearing, piercing and embossing on materials such as wood, metal, felt, leather, rubber, paper and plastics.

The press is a sturdy, one-piece frame, cast from close-grained semi-steel. The open-back permits hand or automatic feeding from front, back or either side. Hold-down slots accommo-





date standard die sets and the press can be inclined for operation in any position.

Hydraulic press

The M & N Hydraulic Press Co., Clifton, N. J., has introduced a new hydraulic press. It is for drawing of drum heads, and deep drawing for various forms or shapes, and is manufactured in capacities from 100 to 600 tons. It is equipped with push-button for semi-automatic operation.

Specifications of American built presses

Rotex Punch Co., Inc. — **San Leandro, Calif.**

Type and Model	Punching Capacity			Clearance	Depth of Throat
Turret Punch Press					
No. 18-B	3/32" to 9/64"	will punch	14 ga. mild steel	7/16"	24" handling
	5/32" to 15/64"	will punch	10 ga. mild steel		48" material
	¼" to ⅜"	will punch	¼" stock		
	25/64" to ⅞"	will punch	10 ga. mild steel		
	57/64" to 1⅛"	will punch	12 ga. mild steel		
	1 33/64" to 2"	will punch	14 ga. mild steel		

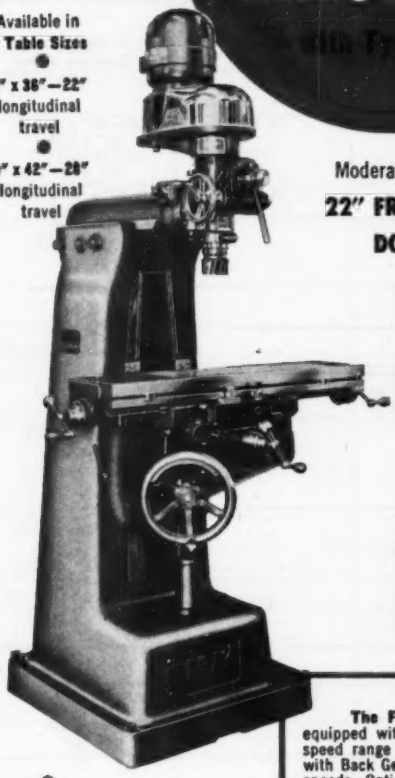
Model 1½ V [illegible]

Fray

MILLING MACHINE

[illegible] with Type 4 Precision Milling Head

Available in
2 Table Sizes
●
9" x 36"—22" longitudinal travel
●
9" x 42"—28" longitudinal travel



Moderate-Price Precision Milling Machine Offers

22" FROM TABLE TOP TO SPINDLE PLUS DOVETAIL WAYS FOR RIGIDITY

All the weight—all the stability you need in a medium-size, **medium-price** Precision Milling Machine. That's what the Fray Model 1½ V gives you in good measure. Designed to take full advantage of high speed steel cutters, the Fray Model 1½ V also provides the rigidity and speeds necessary for use with carbide cutters.

FRAY HEAVY DUTY RAM ASSEMBLY

Available with 12½" Standard Ram Travel or 20½" Optional Ram Travel. Extremely heavy construction, sustained accuracy. Has rack and pinion for positioning, with locking mechanism that assures positive clamping. Built-in worm adapter on ram positions head at desired angle.

The Fray Type 4 Precision Milling Head is equipped with ¾ h.p. motor, providing a standard speed range of 450-6400 r.p.m.—6 speeds. Optional with Back Gear Unit (extra cost): 150-6400 r.p.m.—8 speeds. Optional with Back Gear Unit and 2-speed motor (extra cost): 75-6400 r.p.m.—16 speeds.

Also available: 1 h.p. and 1½ h.p. motors.

●

Write for Circular No. 7 for complete details.

[illegible]

U. S. Tool Co., Inc. — Ampere (East Orange), N.J.

Type and Model	Length of Feed	Max. Width of Stock	Max. Thickness of Stock	Shut Height
Multi-Slide Presses				
No. 11	3″	¾″	1/32″	2¾″
No. 28	8″	1½″	1/16″	3½″
No. 33	12½″	2½″	3/32″	4″
No. 35	12½″	3″	3/32″	4½″

Ferracute Machine Co. — Bridgeton, N. J.

Type and Model	CJ=Shaft Dia. at Journal CC=Shaft Dia. at Crank	SH=Shut Height ST=Stroke (Std.)	Width Between Columns	A=Bed Area O=Opening in Bed
Double Crank Straight Side SF-5-54 SF-5-66 (Crankshaft Flywheel)	CJ=5″ CC=7″	SH=22″ ST=4″	54, 66	A=30″ x 54″; 30″ x 66″ O=21″ x 33″; 21″ x 45″
SGF-5-54 SGF-5-66 SGF-5-78 SGF-5-90 (Crankshaft Single Geared)	do	do	54, 66, 78, 90	A=30″ x 54″, 66″; 36″ x 78″, 90″ O=21″ x 33″, 45″, 57″, 69″
SGF-5½ and SGGF-5½ Eight Sizes (Single Geared)	CJ=5½″ CC=7½″	do	do	do
(Double Twin-Geared) SGF-6 and SGGF-6 Eight Sizes (Single Geared) (Double Twin-Geared)	CJ=6″ CC=8½″	SH=24″ ST=4″	do	A=36″ x 54″, 66″, 78″, 90″ O=27″ x 33″, 45″, 57″, 69″
SGGF-7 Four Sizes (Double Twin-	CJ=7″ CC=10″	SH=26″ ST=4″	do	A=42″ x 54″, 66″, 78″, 90″ O=33″ x 33″, 45″, 57″, 69″
Geared) SGGF-7½ Four Sizes	CJ=7½″ CC=11″	SH=27″ ST=8″	do	A=48″ x 54″, 66″, 78″, 90″ O=33″ x 33″, 45″, 57″, 69″
SGGF-8 Four Sizes	CJ=8″ CC=12″	SH=30″ ST=8″	do	do
SGGF-9 Three Sizes	CJ=9″ CC=13″	SH=34″ ST=8″	66″, 78″, 90″	A=54″ x 66″, 78″, 90″ O=39″ x 45″, 57″, 69″
Super Speed Punch Press I-G 7½ tons	3¼″ dia. at Bearing	SH=5⅞″ ST=(Per minute, Max. and Min.) 1000 and 250	Length of Blank, 4½″ Max. Width, 4½″	A=9″ x 19″ O=5″ x 7″
No. 3 25 Tons	3⅝″ dia. at Bearing	SH=7⅛″ ST=775 and 250	Length of Blank, 6″ Max. Width, 9″	A=12″ x 32″ O=5″ x 10″
No. 30 25 Tons	4¾″ dia. at Bearing	do	do	A=12″ x 32″ O=6″ x 20″

Ferracute Machine Co. — Bridgeton, N. J.

Type and Model	Capacity (Tons)	Shaft Dia. at Journals	A=Area of Bed O=Opening in Bed	SH=Shut Height ST=Stroke (Std.)
Punching Presses (Standard Throat)				
P1-PG1	20	2½"	A=9" x 17" O=6" x 6"	SH=11" ST=1½"
P2-PG2	30	3"	A=10" x 19" O=6" x 8"	SH=12"; ST=1½"
P3-PG3	40	3½"	A=12" x 21" O=8" x 10"	SH=13"; ST=1½"
P4-PG4	55	4"	A=15" x 24" O=10" x 12"	SH=14"; ST=1½"
P5-PG5	75	4¾"	A=18" x 28" O=12" x 14"	SH=15½"; ST=1½"
P6-PG6	105	5½"	A=22" x 33" O=14" x 16"	SH=17½"; ST=1½"
PG-7	150	7"	A=22" x 36" O=14" x 16"	SH=23½"; ST=1½"
O.B.I. CG 18	150	6½" dia. at Bearing 7½" dia. at Crankpin	A=30" x 48" O=20½" x 28"	ST=6" SH=27½";

Perkins Machine Co. — Warren, Mass.

Type and Model	Capacity (Tons)	Dia. of Shaft at Bearings	A=Area of Bed O=Opening in Bed	SH=Shut Height ST=Stroke
High Speed Power Standard Model	3 to 5	1¾"; eccentric, 2¼"	A=5½" x 12½" O=3" dia.	SH=14", from bottom of bed ST=1"
Power Press 2A Dial feeds available in sizes of: 12", 14", 16", 18"	10. This model can be supplied in variety of strokes, die spaces and widths.	1¾"; eccentric, 3¼"	A=7" x 12½" O=4" x 5"	SH=7" ST=1"
O.B.I. 100	5	1⅝"	A=7½" x 12" O=4"	SH=7"; ST=1"
200	9	1¾"	A=7¾" x 13" O=5"	SH=6¾"; ST=1¼"
300	15	2⅛"	A=9" x 16" O=6"	SH=7½"; ST=1½"
351	20	2⅜"	A=11" x 21" O=6½"	SH=7" or 10"; ST=2"
450	35	3"	A=14" x 24" O=9¾"	SH=10"; ST=2"
550	45	3½"	A=18⅛" x 28" O=12"	SH=12½"; ST=2½"
650	60	4¾"	A=20½" x 30½" O=14"	SH=16"; ST=4"
700	75	do	A=22" x 32" O=17"	SH=13"; ST=4"
800	100	5"	A=29" x 40" O=20½"	SH=19"; ST=5"

M & N Hydraulic Press Co. — Clifton, N. J.

Type and Model	Capacity (Tons)	Speed IPM, Up and Down	A=Area of Bed, or Platen O=Operating PSI	SH=Shut Height ST=Stroke
Hydraulic Presses 0410 and 0345 Four sizes	10, 20, 30, 40	150 and 60; 80 and 40	A= 16" x 18"; 18" x 20" O=1000, 2000, 2100, 2750	SH=20", 18", 16" ST=14", 12", 10"
0385 Four sizes	200, 400, 500, 600	120 and 34; 120 and 24; 40 and 30; 90 and 23	A=24" x 24"; 27" x 26" 30" x 30"; 33" x 33" O=2500, 3000	SH=20"; 22" ST=12", 14"
0421 Four sizes	200, 400, 500, 600	8½, 17, 12 (up)	A=18" x 18" O=3000, 6000, 7500, 7000	SH=16", 18" ST=4"
0422 Four sizes	50, 75, 100, 125	60 and 30; 35 and 24; 60 and 23	A=24" x 36"; 26" x 26"; 28" x 26" O=2750, 3000, 2500, 3200	SH=20" ST=12"
30C Four sizes	10, 20, 30, 40	52 and 150; 75 and 75; 75 and 110; 40 and 60	A=18" x 10"; 18" x 12"; 18" x 14" O=1100, 1500, 1200, 1800	SH=12", 18" ST=8", 12"
1R	25, 50, 75, 100	45 and 45; 37 and 53; 18 and 53	A=8" x 15"; 14" x 17" O=2500, 2000, 2750	SH=12", 14" ST=8", 10", 12"
Hydraulic Press For Deep Drawing	100, 200, 300, 400, 600	Advance up to 1100, return 1100 Pin Cushion Area is: 8" x 8"; 15" x 15"; 24" x 24"; 26" x 26"	A=20" x 20"; 30" x 30"; 40" x 40"; 50" x 50"; 60" x 60" O=2700, 3000	Pin Cushion Stroke, up to 12"

Wiedemann Machine Co. — Philadelphia 32, Penna.

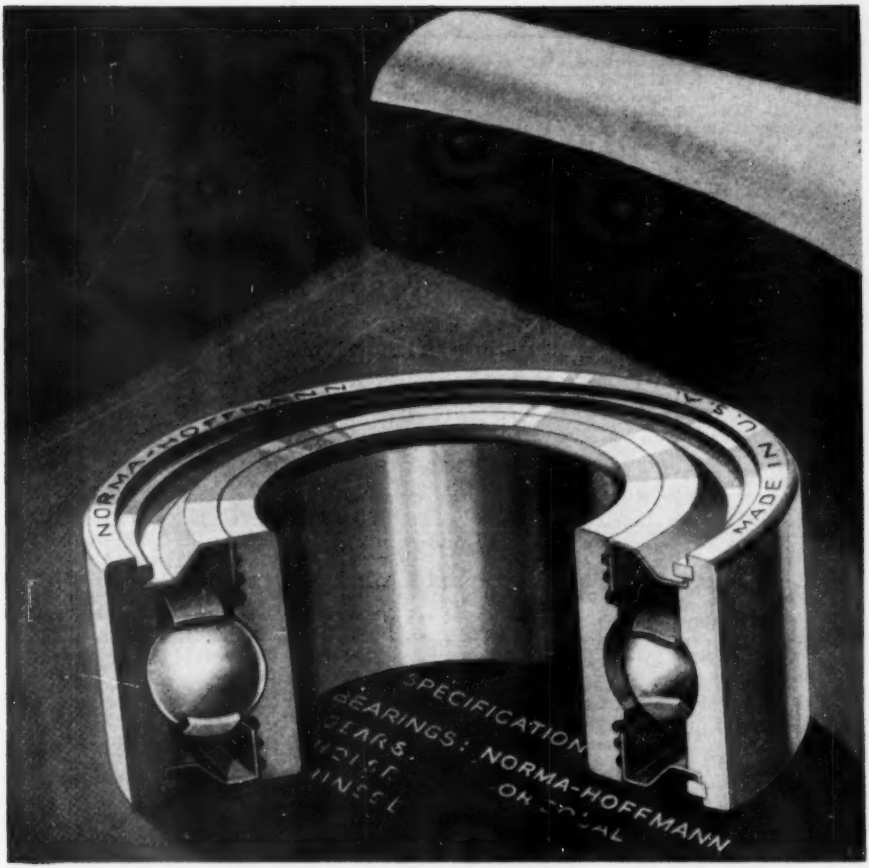
Type and Model	Capacity (Tons)	Throat Depth	Number of Stations	Largest Punch	Diameter Holes in Thickness of Material
Turret Punch Press R-2	7½	12"	12	2¼" in 1/16"	⅝" in ¼"
R-4	7½	18"-24"-28"	12	2¼" in 1/16"	⅝" in ¼"
R-4P	12	18"-24"-28"	12	2¼" in 14 ga.	7/16" in 5/16"
R-41	8	12"-24"-28"	16-18	3⅛" in 18 ga.	⅝" in ¼"
R-41P	15	18"-24"-28"	16-18	3⅛" in 14 ga.	⅜" in ⅜"
RA-41P	15	24" x 24"	16-18-20	3⅛" in 14 ga.	⅜" in ⅝"
RA-41P	15	28" x 40"	16-18-20	3⅛" in 14 ga.	1¼" in 3/16"
R-43	15	24" x 36"	16-18-20	3⅜" in 16 ga.	1" in 3/16"
R-44	15	18"-24"-28"	16-18	3⅛" in 14 ga.	⅜" in ⅜"
R-5	40	18"	12	4⅛" in 3/16"	1½" in ⅝"
R-61	40	33"	16-28	6" in ⅛"	1½" in ⅝"
R-61T	40	33"	20-28	4⅛" in 3/16"	1½" in ⅝"
RA-61	40	33"	16-28	6" in ⅛"	1½" in ⅜"
R-7	80	60"	24-32	6¾" in ¼"	2" in ½"
R-8	50	54"	24-32	6¾" in ⅜"	2" in ½"
R-15	150	60"	24-32	6¾" in 5/16"	4½" in ½"

Danly Machine Specialties, Inc. **Chicago 50, Ill.**

Type and Model	Capacity	Dia. Shaft at Main Bearing	BS=Bed and Slide Dimensions, L to R and F to B O= Opening in Bed (Check Manufacturer For Wide Range of Sizes. Only Smallest and Largest Listed Here)	H=Shut Height T= Stroke (short, long)
Straight Side (Two Point)				
SS-2-100	100	4	BS=36 x 30; 84 x 42 O=21 x 21; 69 x 27	H=18 T=6-12
SS-2-125	125	4½	BS=42 x 30; 84 x 42 O=27 x 21; 69 x 27	do
SS-2-150	150	5	BS=42 x 30; 96 x 48 O=27 x 21; 81 x 33	H=20 T=7-12
SS-2-200	200	5½	BS=48 x 36; 108 x 48 O=33 x 21; 93 x 33	H=22 T=8-14
SS-2-250	250	6	BS=48 x 42; 120 x 54 O=33 x 27; 105 x 39	H=24 T=10-16
SS-2-300	300	6½	BS=60 x 48; 32 x 60 O=45 x 33; 117 x 45	H=26 T=10-18
SS-2-400	400	7	BS=60 x 48; 132 x 66 O=45 x 27; 117 x 45	H=30 T=12-18
SS-2-500	500	8	BS=72 x 54; 156 x 66 O=57 x 33; 141 x 45	H=32 T=12-20
SS-2-600	600	9	BS=72 x 60; 156 x 72 O=57 x 39; 141 x 51	H=34 T=14-22
SS-2-800	800	10	do	H=36 T=14-22
SS-2-1000	1000	11	BS=84 x 66; 180 x 78 O=69 x 45; 165 x 45	H=38 T=16-24
SS-2-1250	1250	12	BS=84 x 78; 180 x 78 O=69 x 57; 165 x 57	H=40 T=16-24
SS-2-1600	1600	13	BS=96 x 84; 204 x 84 O=81 x 57; 189 x 57	H=42 T=18-30
SS-2-2000	2000	14½	do	H=44 T=18-32
SS-2-2500	2500	16	BS=108 x 96; 228 x 96 O=93 x 69; 213 x 69	H=46 T=18-34

Danly Machine Specialties, Inc. — Chicago 50, Ill.

Type and Model	Capacity	Dia. Shaft at Main Brgs.	B=Bed and Slide Dimension, inches O=Opening in Bed, inches (Check manufacturer for range of sizes. Only smallest and largest listed here)	SH=Shut Height ST=Stroke (short-long)
Straight Side Press (Four Point Single Action)				
SS-4-200	200	4½	B=48 x 48; 108 x 54 O=33 x 33; 93 x 39	SH=22 ST=8-14
SS-4-250	250	5	B=48 x 48; 132 x 66 O=33 x 33; 117 x 51	SH=24 ST=10-16
SS-4-300	300	5½	B=60 x 48; 132 x 66 O=45 x 33; 117 x 51	SH=26 ST=10-18
SS-4-400	400	6	B=72 x 54; 156 x 78 O=57 x 39; 141 x 47	SH=30 ST=12-18
SS-4-500	500	6½	B=72 x 60; 57 x 39 O=204 x 108; 189 x 87	SH=32 ST=12-20
SS-4-600	600	7	B=84 x 60; 69 x 39 O=204 x 108; 189 x 87	SH=34 ST=14-22
SS-4-800	800	8	B=84 x 60; 204 x 108 O=69 x 39; 189 x 87	SH=36 ST=14-22
SS-4-1000	1000	9	B=96 x 66; 228 x 108 O=81 x 45; 213 x 87	SH=38 ST=16-24
SS-4-1250	1250	10	B=96 x 72; 228 x 108 O=81 x 51; 213 x 87	SH=40 ST=16-26
SS-4-1600	1600	11	B=96 x 78; 228 x 108 O=81 x 51; 213 x 81	SH=42 ST=18-30
SS-4-2000	2000	12	B=108 x 84; 228 x 108 O=93 x 57; 213 x 81	SH=44 ST=18-32
SS-4-2500	2500	13	B=120 x 96; 228 x 108 O=105 x 63; 213 x 75	SH=46 ST=18-34



. . . There Is No Equal!

Leading manufacturers endorse the patented Norma-Hoffmann "Cartridge" Bearing because it is unequalled for continuous performance and long operating life.

The highly efficient seals plus the carefully metered volume of Norma-Hoffmann's specially compounded grease combine to give this bearing its unique operating characteristics. Designers of all types of equipment know from experience that there is no equal to its long-lived, efficient performance.

To give *your* customers greater value in *your* products, be sure your design prints read—"Norma-Hoffmann *'Cartridge'* Bearings."

NORMA-HOFFMANN
Precision
BEARINGS
BALL • ROLLER • THRUST

NORMA-HOFFMANN BEARINGS CORPORATION, Stamford, Connecticut — Founded in 1911
FIELD OFFICES: Chicago • Cincinnati • Cleveland • Dallas • Detroit • Kansas City • Los Angeles • San Francisco • Seattle

Danly Machine Specialties, Inc. — Chicago 50, Ill.

Type and Model	Capacity (Tons)	Dia. Shaft at Main Bearing	W = Width Between Uprights (inches) B = Bolster Area (inches) BO = Bed Opening (inches)	SH = Shut Height ST = Stroke (Std.)
Straight Side (One-Point) SS-1-100	100	5½	W = 32 B = 24 x 30 BO = 20 x 20	SH = 18 ST = 6-12 (short-long)
SS-1-125	125	6	do	do
SS-1-150	150	6½	do	SH = 20 ST = 7-12
SS-1-200	200	7	W = 32, 38 B = 24 x 30; 30 x 36 BO = 20 x 20; 24 x 24	SH = 22 ST = 8-14
SS-1-250	250	8	do	SH = 24 ST = 10-16
SS-1-300	300	9	W = 38, 44 B = 30 x 36; 36 x 42 BO = 24 x 24; 28 x 28	SH = 26 ST = 10-18
SS-1-350	350	9½	do	SH = 28 ST = 12-18
SS-1-400	400	10	W = 38, 46 B = 30 x 36; 36 x 42 BO = 24 x 24; 28 x 28	SH = 30 ST = 12-18
SS-1-500	500	11	W = 44, 50 B = 36 x 42; 42 x 48 BO = 28 x 28; 32 x 32	SH = 32 ST = 12-20
SS-1-600	600	12	do	SH = 34 ST = 14-22
SS-1-800	800	13	do	SH = 36 ST = 14-22
SS-1-1000	1000	14½	W = 50, 56 B = 42 x 48; 48 x 54 BO = 32 x 32; 36 x 36	SH = 38 ST = 16-24
SS-1-1250	1250	16	W = 56, 62 B = 48 x 54; 54 x 60 BO = 36 x 36; 42 x 42	SH = 40 ST = 16-26
SS-1-1600	1600	18	do	SH = 42 ST = 16-26

Benchmaster — Gardena, Calif

Type and Model	Capacity (Tons)	Crankshaft at Main Bearing	A = Area of Bed O = Opening in Bed	SH = Shut Height ST = Stroke
1 Ton (standard)	1	¾"	A = 4" x 6" O = 2¼" x 2¼"	SH = 3⅜" ST = ¾"
4 Ton (standard; half press; geared; also deep throat models)	4	1⅜"	A = 6" x 8" O = 4¾" x 3¼" (For Deep Throat, 3⅛" x 3⅛")	SH = 7" ST = 1"
7½ Ton (standard; half press; geared)	7½	1½"	A = 8" x 11" O = 4" x 5"	SH = 7½" ST = 1¼"

Danly Machine Specialties, Inc. **Chicago 50, Ill.**

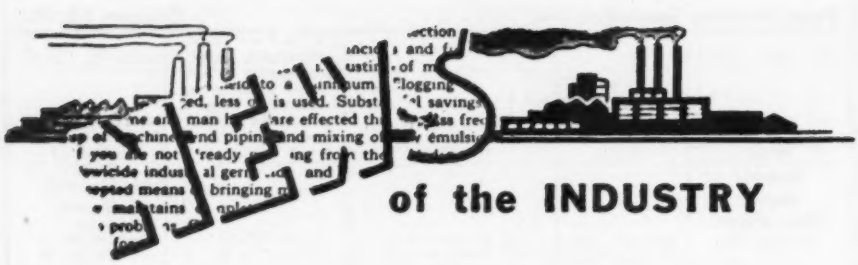
Type and Model	Capacity	Dia. Shaft at Main Brgs.	B=Bed and Slide Dimension, inches O=Opening in Bed, inches (heck manufacturer for range of sizes. Only smallest and largest listed here)	SH=Shut Height ST=Stroke (short-long)
Double Action (One Point) D1-250-42-42	250 Inner slide 125 Blank holder	12" Effective draw 42" Width between uprights	B=42 x 42 O=27 x 27	SH=34 and 32 ST=26 and 18
(Two Point) D2-600-108-72	600 Inner slide 350 Blank holder	15" Draw 108" Between uprights	B=108 x 72 O=93 x 51	SH=63 and 60 ST=33 and 22
(Four Point) D4-1000-132-84	1000 Inner slide 600 Blank holder	15" Draw 132" Between uprights	B=132 x 84 O=117 x 63	SH=75 and 70 ST=33 and 22
Underdrive Presses Single Action U4-600-96-72	600	9" Dia. at main bearings 96" Between uprights	B=96 x 72 O=82 x 52	SH=60 ST=20
Double and Triple Action DU4-800-120-72	800 Inner slide 600 Blank holder	14" Draw 120" Between uprights	B=120 x 72 O=105 x 51	SH=98 and 88 ST=42 and 32

Employee injury prevention aided

The National Safety Council's small business program, which was put on a full-time basis in 1951, has been insured of continued progress through the increase of its grant from the National Association of Mutual Casualty Companies to $24,500. The program is now administered by a staff of three in the Council's Chicago headquarters assisted by a small business and associations committee.

The added funds will enable the program to extend more help to associations, local safety councils and other business groups, the Council said. These organizations can then stimulate more than three million small employers to increased control of work accidents.

Fifty years of continuous service were marked at an informal meeting at the National Acme Co., Cleveland, recently, as company president F. H. Chapin, right, placed a diamond-studded 50-year pin in the lapel of Albert E. Henn, center, sales manager of the company's machinery division. C. W. Simpson, executive vice-president, is at the left.



Reorganization at Jones & Lamson Results in 3 Decentralized Operating Divisions

JONES & LAMSON Machine Co., Dept. 710, 522 Clinton St., Springfield, Vt., announces a reorganization of its operations in Springfield with the formation of three decentralized operating divisions, the creation of a marketing division and the creation of the position of manager of manufacturing.

The formation of three operating divisions—machine tools, comparator, and thread tool—each under the direction of a manager and a complete operating staff provides greater concentration of effort on every operating problem of each company product.

The creation of a new marketing division places all district office organizations, agents, distributors (both foreign and domestic), public relations and advertising, market research and sales analysis, as well as all sales policies, under the direction of **Howard A. Finch**, who has been named manager of that division.

J. Russell Knights, presently manager of foreign sales, is attached to and made a part of Finch's organization. Knights has recently returned from an extended survey of the European markets and will shortly return to continue the formation of a sales organization in that field.

Jordan D. Wood, manager of public relations and advertising, and **N. R. Kidder**, manager of market research and sales analysis, are attached to and made a part of the new marketing division.

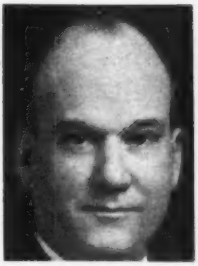
The creation of the position of manager of manufacturing and the appointment of **Robert S. Jones** as manager places responsibility for all manufacturing and labor policies for the entire company under the direction of one individual and will insure the use of the most modern methods and policies in each of the three divisions.

H. A. Finch

R. S. Jones

R. O. Beardsley

J. E. Barbier



J. C. Hebert

D. N. Smith

James C. Hebert has been appointed manager of the machine tool division, **Robert O. Beardsley** of the comparator division, **John E. Barbier** of the thread tool division and **David N. Smith** of engineering research.

Mobile unit for milling machines' display

Gilco Industrial Supplies Co., 2625 Lathrop, Racine, Wis., is now servicing the state of Wisconsin with a mobile unit displaying Arboga milling machines and drill presses.

SIGOURNEY

M-100

the **PRECISION BENCH DRILLING MACHINE**

No ordinary bench drilling machine, but an extremely accurate, high speed, sensitive machine for precision drilling. Drills from ¼" down to extremely small sizes. Successfully used down as far as .008".

Table and column exactly squared, one to the other, and built with strength and rigidity for maintained accuracy. Hardened and ground spindles insure long life. Sealed ball bearings throughout for smooth operation from 4,000 r.p.m. to 10,000 r.p.m. Motor, driving belt, and spindles entirely enclosed for safety. Available with 1, 2, 3 and 4 spindles.

SEND FOR ILLUSTRATED BULLETIN

THE SIGOURNEY TOOL CO.
HARTFORD 6, CONN.

Sole Sales Agent

PRATT & WHITNEY

Division Niles-Bement-Pond Co. ... West Hartford, Connecticut

ISG54

Carborundum buys ceramic manufacturing company

Agreement has been reached for The Carborundum Company to acquire the capital stock of the Stupakoff Ceramic and Mfg. Co., of Latrobe, Pa., according to **Maj. Gen. Clinton F. Robinson,** president of Carborundum in Niagara Falls, N. Y.

Gen. Robinson said Stupakoff Ceramic and Mfg. will continue operations under its present name and the present organization and personnel of Stupakoff will be retained under the direction of **Semon H. Stupakoff,** president of the company. Stupakoff manufactures ceramic and other components used in the electrical and electronic industries.

Dr. Carl B. Post, chief metallurgist, has been appointed head of the metallurgical and research departments of the Carpenter Steel Co., Reading, Pa., according to president Frank R. Palmer. He also announced the retirement of **George V. Luerssen,** vice-president in charge of metallurgy, after 47 years of service with the company.

We're Looking for Head Hunters!
US HEADS
Most machine tool men have long relied upon the "US" Adjustable Multiple Spindle Drill Heads. But we are looking for those who still haven't tried them . . . and who are looking for the best.
With their quick-change universal joint assemblies, they are built for continuous use, with full anti-friction bearing construction for high capacity thrust loads. The universal joint adjustable multiple spindle type is suitable for any sensitive drilling machine. Joints are self-lubricating. All gears are hardened and shaved with spindles superfinished.
The single eccentric type is used for equally spaced holes on bolt circles.
The new double eccentric AdjUStafix, two to eight spindles, permits spindles to be located in non-symmetrical paterns. It eliminates expensive change in set-up.
Single eccentric type for equally spaced holes on bolt circles
Universal joint with slip spindle fixed locating plate
Double eccentric type for irregular spacing
Write for details on any type of universal joint adjustable head. Ask also about our totally enclosed gear-driven adjustable, fixed center, or individual lead screw tapping heads.
UNITED STATES DRILL HEAD COMPANY
616-618 BURNS STREET • CINCINNATI 4, OHIO

Hanna Engineering Works, Chicago, has announced the recent appointment of two Southern firms as sales representatives covering North Carolina, South Carolina and Georgia. The Barker Instrument & Machine Co. will serve both of the Carolinas. **John Barker** operates the office at Charlotte, N.C.; and **Harold Barker** is in charge at Greenville, S.C. Exclusive representative for Hanna in Georgia is the Carl B. Pederson Co., Atlanta, headed by **Carl B. Pederson.**

W. T. Cole Co. moves

The Walter T. Cole Co., has moved from Grand Island, N.Y., to Phoenix, Ariz. New plant facilities have been acquired at 3217-E. Washington St.

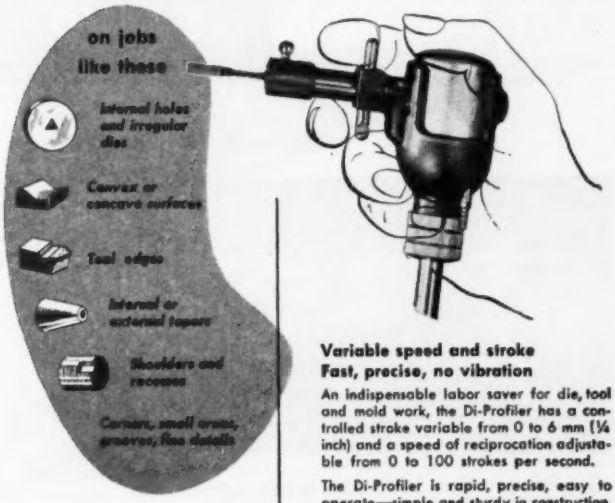
Geargrind acquires Republic Gear and subsidiaries

The Gear Grinding Machine Co. has acquired the assets of the Republic Gear Co., Detroit, and its wholly owned subsidiaries, Detroit Bevel Gear Co. and Almetal Universal Joint Co., Cleveland, Ohio.

THE **Di-Profiler**

RECIPROCATING HAND MACHINE

for time-saving cutting—roughing—finishing


on jobs like these
Internal holes and irregular dies
Convex or concave surfaces
Tool edges
Internal or external tapers
Shoulders and recesses
Corners, small areas, grooves, fine details

Variable speed and stroke
Fast, precise, no vibration

An indispensable labor saver for die, tool and mold work, the Di-Profiler has a controlled stroke variable from 0 to 6 mm (¼ inch) and a speed of reciprocation adjustable from 0 to 100 strokes per second.

The Di-Profiler is rapid, precise, easy to operate—simple and sturdy in construction. Its weight of less than one pound and freedom from vibration eliminate fatigue and assure perfect control for the most intricate work.

Moderately priced, the Di-Profiler pays for itself many times through time-saving cost reductions.

Write for free demonstration or illustrated price list DB-1154

Tools for every type of work
CUTTERS, FILES, DISCS, POINTS, BURRS, LAPS, SCRAPERS

ENGIS EQUIPMENT COMPANY
Sole Authorized Distributor for the United States
431 S. Dearborn Street, Chicago 5, Illinois

Arthur W. Johnson

Arthur W. Johnson, former assistant chief engineer of Arms Franklin Corp., has joined the engineering staff of the E. W. Bliss Co., Rolling Mill Division, Salem, Ohio.

Rodney C. Gott, a director and vice-president of American Machine & Foundry Co., New York City, has been named executive vice-president of AMF. Gott has been vice-president in charge of AMF's general products group and commercial research and development since April 1951. He was elected to the board of directors two years later.

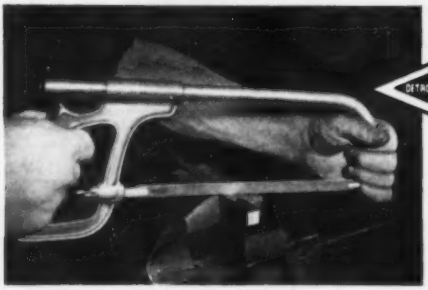
Rodney C. Gott

BUY THE BEST

BUY BARNES

HAND HACK SAWS

"LOOK FOR THE DIAMOND"



DETROIT BARNES U.S.A.

CALL YOUR DISTRIBUTOR

Six Barnes Hand Blades, all famous for quality, are available to meet every metal cutting requirement.

DETROIT BARNES U.S.A.

ESTABLISHED 1919

W. O. BARNES CO., INC.

1297 TERMINAL AVE. • DETROIT 14, MICH.

Price reduction through Jetwelding

The Lincoln Electric Co., Cleveland, Ohio, has reduced prices on its 300, 400 and 500 ampere transformer type AC welders by approximately 11, 12 and 24 per cent respectively. This price reduction was made, Lincoln states, to complement its recent introduction of Jetweld, electrodes with powdered metal coatings.

These electrodes, now generally available in standard sizes and several classifications, are setting new standards of speed, cost, appearance and operating factors.

Change Firth-Sterling Alabama address

Firth Sterling Inc., 3113 Forbes St., Pittsburgh 30, Pa., has announced a change of address for their southern district office. New address is 2201 Highland Ave., Birmingham 5, Ala. They were formerly located at 2308 Fourth Avenue North, Birmingham, Ala.

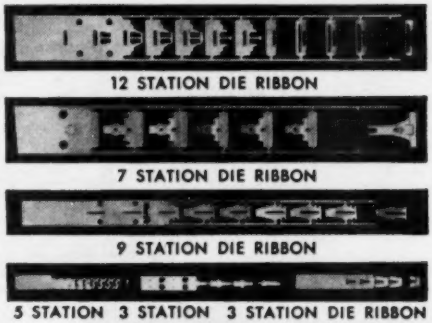
Firth Sterling is one of the country's leading manufacturers of tool and die steel, sintered carbides, and high temperature materials.

B. Jahn DIES PRODUCE . . . . . .

Every Metal Component of the Eversharp Hydro-Magic Razor!

TO LESS THAN WHISKER-THIN TOLERANCES . . . WITH "PRODUCTION PROVED" PERFORMANCE AND ECONOMY!

Eversharp-Schick specified dies to mass produce a razor of superior quality . . . flawless operation . . . competitive price. Working against a tight schedule, B. Jahn evolved a series of progressive dies that turned out each individual metal component used in the razor! Every close tolerance was faithfully met — all specifications of die performance were adhered to — every requirement of product quality and accuracy was engineered and built into the dies by B. Jahn. To guarantee customer satisfaction, components were submitted to Eversharp-Schick for actual assembly line use before the dies were certified "PRODUCTION PROVED" and shipped!



12 STATION DIE RIBBON

7 STATION DIE RIBBON

9 STATION DIE RIBBON

5 STATION 3 STATION 3 STATION DIE RIBBON

Send today for the fact-packed, picture story of "B. Jahn Production Proved Dies!"

B. Jahn

B. JAHN MANUFACTURING COMPANY NEW BRITAIN, CONNECTICUT

Thirty-sixth national metal congress and exposition

On Monday, Nov. 1, 1954, and continuing through Friday, Nov. 5, the American Society for Metals will present the 36th annual national metal congress and exposition—The Metal Show—in Chicago.

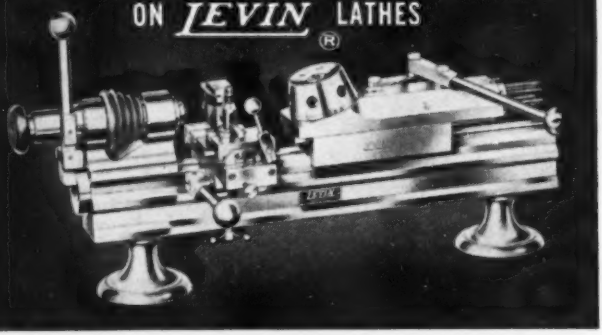
The National metal congress will be held in the headquarter hotels of the participating societies; the national metal exposition will be held in Chicago's International Amphitheatre, Halsted at 43rd St.

N.F.P.A. meets at New York

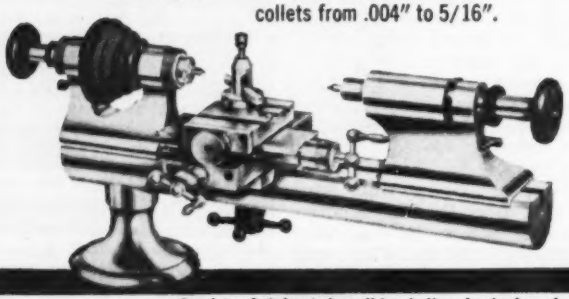
The National Fluid Power Association recently held its 1954 fall meeting at New York. Ninety-two representatives from the 64 member companies and guests heard reports from committees on markets, education, government relations, design standards, ratings, terminology, fluids and symbols.

The 1955 spring meeting will be held in Colorado Springs, Colo., on April 5, 6 and 7. The 1955 fall meeting will be held in Chicago on November 2, 3 and 4.

SMALL INSTRUMENT PARTS ARE MADE BEST ON *LEVIN* LATHES ®



Twenty-three models for all types of work. 4" swing, Bed Length 12" or 18"; over 100 stock sizes of collets from .004" to 5/16".



Send for Catalog L describing Lathes for tool work, second operations; turrets and full line of accessories.

LOUIS LEVIN & SON, INC., 782 E. PICO BLVD., LOS ANGELES 21, CALIF.

Raymond S. Fox

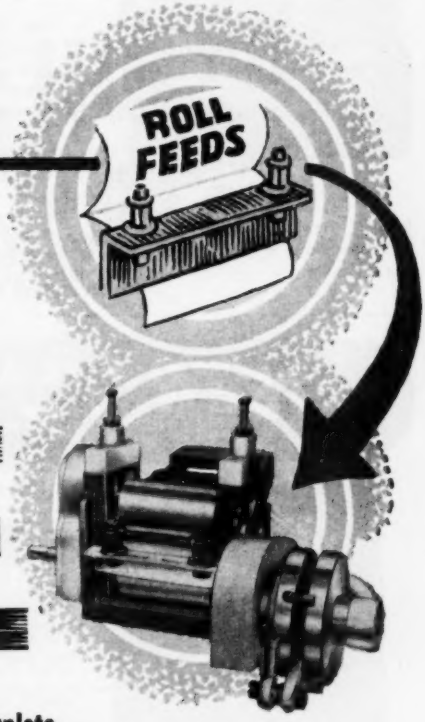
Charles A. Whitney

Raymond S. Fox has been appointed to the position of chief engineering consultant of the Pratt & Whitney gage div., West Hartford, Conn., and **Charles A. Whitney** to chief engineer of the gage engineering department.

Plastics engineers conference

Society of Plastics Engineers, Inc., Southern California Section, will sponsor an industrial conference coincident with the First American Society of Tool Engineers' Western Industrial Exposition in Los Angeles next March.

"RFC" ROLL-FEEDS



FITS ANY PRESS

For side or rear feeding. All attachments for installing furnished, including disc and connecting linkage.

CAN'T SLIP

Each wedge has four points of contact to safeguard accuracy.

REVERSES INSTANTLY

Merely shift feed finger spring from one lug to the other.

FEEDS IN THOUSANDTHS

Amazingly accurate stock movement assured.

MAINTAINS ORIGINAL SETTING

Regardless of use or wear. No ratchets or pawls to wear down and "Throw off" feed spacing.

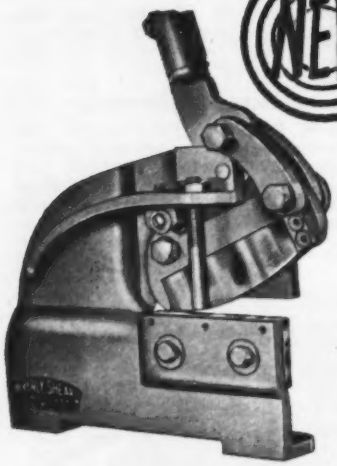
Ready for mounting! Furnished complete.

Write today for latest Bulletin.

EARLY DELIVERY ON STANDARD MODELS

Roll-Feeds Corporation

ASHTON, R. I.



NEW

Beverly SLITTING SHEAR

MORE POWER . . . Easier Cutting
EXCLUSIVE DESIGN . . . Cleaner Cuts
RUGGEDLY BUILT . . . Last a Lifetime
CAPACITIES TO 3/16"

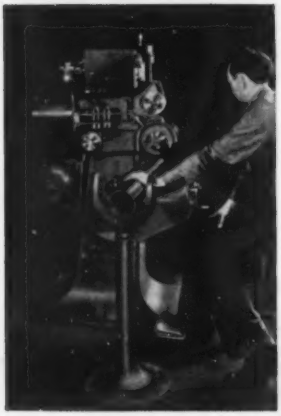
Get faster, easier slitting and trimming with a new design Beverly "SS" Series Slitting Shear. Rigid, strongly braced frame; compounded linkage and extra strength where needed. Many exclusive features. Write for FREE illustrated Bulletin.

See your Beverly Distributor today.
Ask for a demonstration—no obligation.

SS-3/16" slitting cap; 1/4" trimming; 1/2" x 2" bar capacity.

Beverly SHEAR MFG. CO.
3005 W. 111th STREET • CHICAGO 43, ILLINOIS

STEEN PIPE AND TUBE CUT-OFF MACHINES



For faster cutting

If you cut pipes and tubes . . . in small or large quantities . . . you can cut faster—easier—with a Steen Cut-Off Machine. Available in hand and automatic air-operated models for pipes and tubes up to 12" diam. *Also, Manufacturers of Cut-Off Wheels . . . Chaser and Wheel Grinders. Request Circulars Today.*

Continental MACHINE CO.
SINCE 1919
1952 N. MAUD AVE. • CHICAGO 14, ILL.

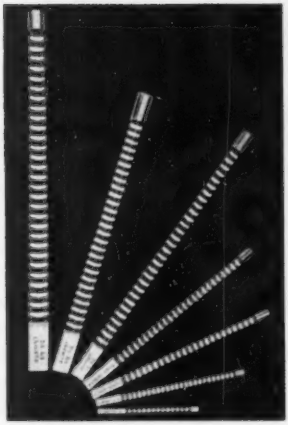
Denison announces new aircraft products division

A new division of The Denison Engineering Co. of Columbus, to be known as the aircraft products division, has recently been established. **Edwin L. Shaw,** right, has been appointed head of the division. **Roland N. Crossley,** left, is director of sales.

Robert W. Peterman has been appointed sales manager of the Nopak Div. of the Galland-Henning Mfg. Co., Milwaukee, Wis. **Robert J. Garnik** is now chief engineer.

SQUARE HOLES

Quick—at Low Cost



New

du Mont *Minute Man* High Speed Steel Square Broaches finish cast or drilled holes in one pass, using arbor or hydraulic press. Available from your nearby Industrial Distributor for 3/16" to 3/4" squares AT UNBELIEVABLY LOW PRICE. Clip coupon and see for yourself.

The du MONT CORPORATION, Greenfield, Mass.

Please mail Data Sheet and Price List "T" and the name of nearest stocking distributor of the new Minute Man Square Broaches to

Name.....

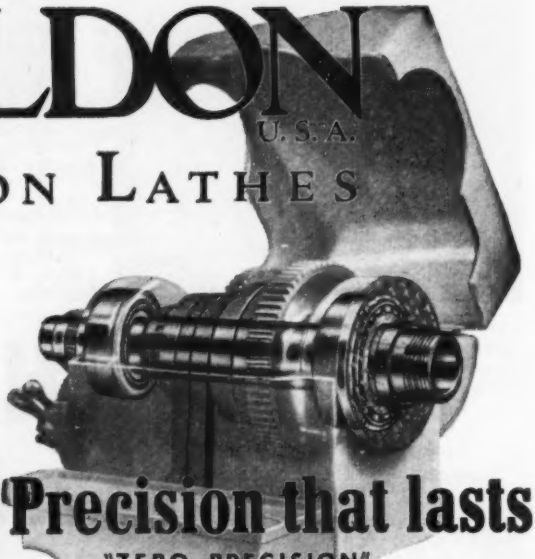
Company.....

Address.....

SHELDON

CHICAGO U. S. A.

PRECISION LATHES



Precision that lasts

. . . "ZERO PRECISION" TAPER ROLLER BEARINGS

No lathe can be more accurate than its spindle bearings. Hence before buying any lathe one should check the exact type and tolerances of bearings used!

All SHELDON Precision Lathes have "Zero Precision" Taper Roller Bearings, held to tolerances of .00015"—more accurate than the bearings found in most lathes. They are also the sturdy type that hold their accuracy thru long, hard use . . . hold it even under abuse. With the other stamina features built into SHELDON Precision Lathes, they assure continued accuracy, without costly maintenance, thru years of hard service.

SHELDON "Stamina" Features:

- Rigid, Heavily cross-strutted 1-piece Beds—2 V-ways, 2 Flat ways
- Full Double-Walled Aprons—all gear shafts supported on both ends.
- Heavy Carriage with wide bearing on bed.
- Twin V-Belts to Spindle for extra power.

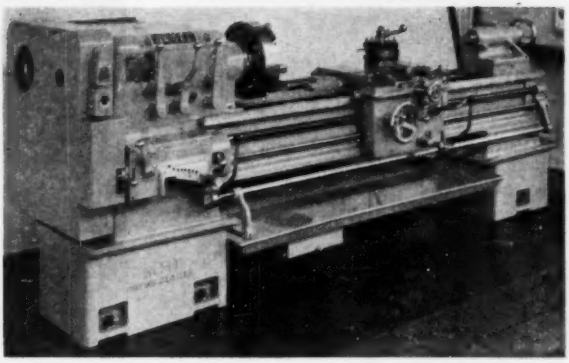
Write for Catalog

SHELDON MACHINE CO., INC.

4242 N. Knox Ave., Chicago 41, Illinois

What's New

Sixteen inch engine lathe has increased power, capacity



The 16″ LA engine lathe recently announced by the Nebel Machine Tool Co., Dept. BB, Cincinnati 25, Ohio, is said to be heavier, more powerful, have more capacity, and to approach toolroom lathes for accuracy.

The headstock has shaved and hardened gears throughout, larger Timken anti-friction bearings, short shafts, wider gears. Helical drive gears assure smooth, powerful drive.

Capacity is 18½″ swing over the ways, 24″ center distance on lathe with 6′ bed. It is built to accommodate a 7½- or 10 hp main drive motor, and has 12 or 24 spindle speeds ranging from 13 to 750 rpm.

Apron and carriage are larger than on previous 16″ models. Tailstock is larger, too, and has larger spindle. Gears in the apron and quick change box are made of heat treated steel.

The LA series is also made in a 20″ engine lathe size and in 16″/27″ and 20″/30″ removable block gap models.

Use ACTION Card, opposite page 64. Encircle No. 1

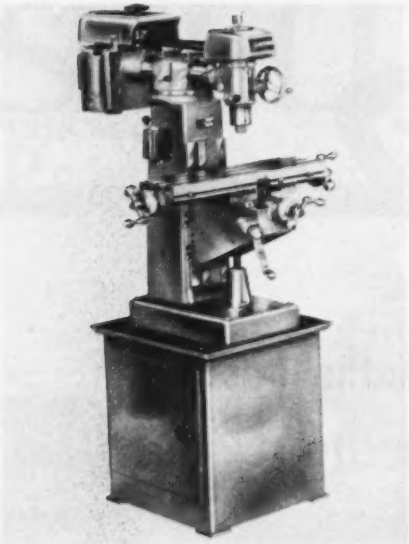
All-angle milling with one setup

The new Clausing vertical milling machine has a spindle head which can be swiveled in a vertical plane and set at any angle, and turret rotated in a horizontal plane making it possible to mill at all angles with one setup, the manufacturer claims.

There are 7 ball bearings in the drive. Ground overarm is an electric furnace casting with ¾″ thick walls.

Quill has micrometer depth control stop and two feeds, lever and hand wheel. The machine handles both small and large cutters.

Specifications: 6″x24″ table with 15″

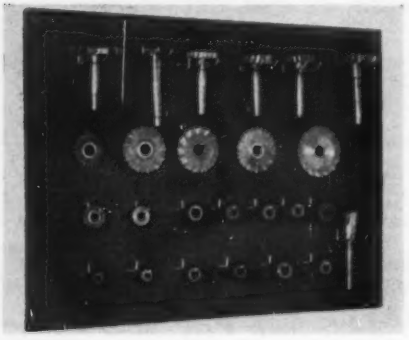


longitudinal and 5″ transverse travel; 12″ vertical knee travel; 8¾″ maximum spindle to column; 3″ quill travel; 6 spindle speeds; operates from ½ or ¾ h.p. motor. Clausing Div., Atlas Press Co., 5350 N. Pitcher Street, Kalamazoo, Mich.

Use ACTION Card, opposite page 64. Encircle No. 2

Industrial tool board

The Payton Co., Dept. TBM, 6238 Northwest Highway, Chicago 3, Ill., designed and built the "Peg Board," which is a practical method of storing tools, without damaging or dulling cutting edges. Industrial concerns use the boards in the particular division in which the tools are being used, making it unnecessary for employees to go to a tool crib. Associate tools or tools of similar sizes can be stored on the same or adjacent hooks, and this facilitates quick location of the tools and results in time savings. Another feature is that the boards can be mounted on the wall, saving floor space. Complete line of fixtures is available and standard hooks in various sizes and styles can be used for holding tools or parts of any size or shape.



Use ACTION Card, opposite page 64. Encircle No. 3

Coolant aerator eliminates splash

The Mel-O-Flo coolant aerator is claimed to apply coolants without splash. It is connected directly to the coolant line and mixes atmospheric air with the coolant, resulting in an aerated mixture which clings to work and tools, accelerating heat dissipation.

Whenever the coolant supply is turned off, the aerator is automatically purged of chips and sludge. Melard Mfg. Corp., Dept. BB, 432 Austin Pl., New York 55, N.Y.

Use ACTION Card, opposite page 64. Encircle No. 4

Chrome finish steel rules

Brown & Sharpe Mfg. Co., Dept. BB, Providence 1, R.I., has announced nonglaring chrome finish steel rules claimed to be easier to read, rust and stain resistant, long wearing.

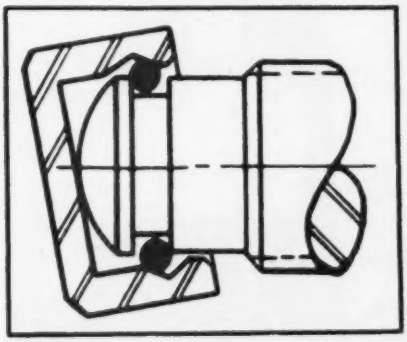
Use ACTION Card, opposite page 64. Encircle No. 5

Toggle shoe clamp has retaining spring

A new type toggle shoe clamp has been announced by Northwestern Tool and Engineering Co., Dept. BB, 118 Hollier Ave., Dayton 3, Ohio.

A retaining spring is used to hold the shoe in place, yet allows a 10° adjustment in all directions. This provides for simple assembly since the shoe snaps on or off.

The shoe requires a minimum distance between the fixture and the work. It is



also small in diameter to eliminate interference.

Single point contact is claimed to insure immediate action at the first touch of the work. Both the shoe and the screw are heat treated.

Use ACTION Card, opposite page 64. Encircle No. 6

Job-type and short production run balancing service

Although dynamic balancing is not new, job-type balancing on a paying basis is as yet unfamiliar to many manufacturers.

The newly formed Electronic Dynamic Balancing Co., Dept. BB, 1614 N. Hermitage Ave., Chicago 22, Ill., claims the ability to handle the usual precision balancing job with alacrity, since most cases require no couplings, adapters, or special bearings.

In the manufacture of milling heads, pump impellers, turbine rotors, gears, etc., job-type balancing is claimed to have opened up new fields in balancing.

Because of the versatility and quick setup, this type of service is adaptable to maintenance and experimental balancing as well as balancing components to a company's product.

Use ACTION Card, opposite page 64. Encircle No. 7

You can now use your broken tang drills, reamers, end mills and other taper shank tools!

Made of the finest spring steel, the newly developed PILOT sleeve grips the tool firmly along the full length of the taper with far greater surface contact than any ordinary sleeve. Tool and sleeve become almost a solid assembly, yet can be disengaged with a simple twist of the wrist! Never any jamming or scoring to mar the shank.

The PILOT's patented flexible construction assures concentricity. Regrinding of tools is made easy because it adapts itself to any surface irregularity inside the machine spindle and around the tool.

Cut costs . . . Order the PILOT in the types and sizes you need, new!

TYPE A: For drills, etc. with or without broken tang.

TYPE B: For drills, etc. with broken tang only. Ideal for heavy duty drilling.

Size No.	1	2	3	4	5
Morse Taper	1:2	2:3	3:4	4:5	5:6
Price—FOB New York	$4.00	$6.00	$8.00	$16.00	$25.00

PILOT TOOLS, INC. | 225-A LAFAYETTE STREET NEW YORK 12, N. Y. Telephone WOrth 4-8360-61

PRODUCTION BORING with E-Z SET by Maxwell

Only the MAXWELL E-Z Set boring tools feature high speed operation, micrometer-like adjustment to 0.0001-inch and maximum boring range.

Interchangeable shanks permit E-Z Set boring tools to be used in turret lathe, jig-bore, milling machine, boring mill, automatic or other machine tools. Because they can be adjusted for cut in only one-tenth the time formerly required by similar tools, these Maxwell-made tools can meet high-speed production on schedules.

E-Z Set boring tools are available in three models having maximum boring bar capacities of ½, 1 and 1½ inches and covering a boring range of from ⅜ to 20 inches.

Write today for catalog

BMS-MC

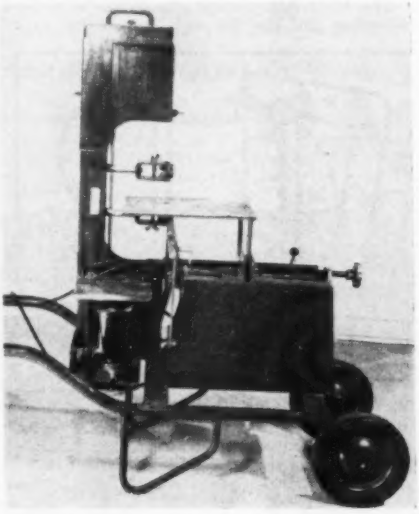
THE MAXWELL COMPANY

220 Broadway • Bedford, Ohio

Portable metal cutting band saw is three-in-one

The Temac 3-way portable metal cutting band saw provides the properties of three saws in one unit: a horizontal jackknife style, an upright table saw, a saw for cutting all angles up to 45°.

The cutting carriage can be adjusted sideways to facilitate fine placement of



the blade with reference to the cutoff mark.

The unit has a capacity of 6″ x 8″. Manufactured by Tester Mfg. Co., Dept. B, Iron River, Wis. Distributed by McCarty Machinery Sales, Dept. MTB, Bayfield, Wis., and Dutch Stark Co., Reseda, Calif.

Use ACTION Card, opposite page 64. Encircle No. 8

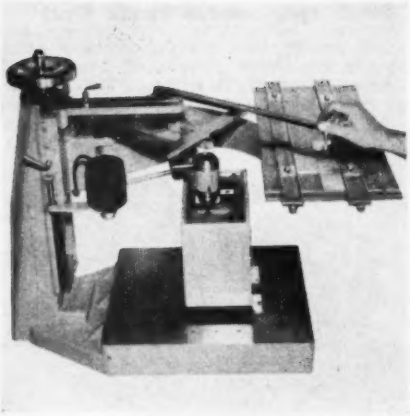
Pantograph engraving machine

A pantograph engraving machine specifically developed for the engraving of large-size or bulky workpieces offers a simplified design which is claimed to provide freedom and accessibility.

Engraver is operated by tracing master copy with a stylus. A high speed cutter duplicates the master in the ratio desired.

It will engrave all metals, using either high-speed steel, carbide or diamond cutters.

Its 2-dimensional pantograph offers reduction ratios from the master copy



ranging from 2 to 1 to infinity. A single hand-wheel control adjusts both the master copy and the cutting tool vertically in increments of a thousandth of an inch. Circles up to 7" in diameter may be engraved at the 2 to 1 ratio. The Green Instrument Co., Dept. BB, 385 Putnam Ave., Cambridge, Mass.

Use ACTION Card, opposite page 64. Encircle No. 9

Treatment for abrasive surfaces eliminates loading

No-Load is a treatment for abrasive surfaces, designed to eliminate the undesirable coating commonly known as "loading." A clean, free cutting surface provides greater production and longer abrasive life.

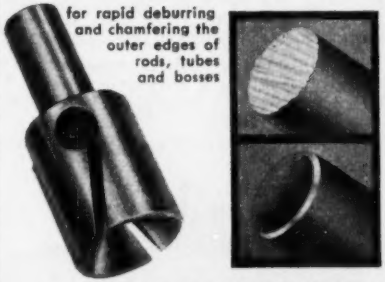
Under normal conditions No-Load exists as a solid, but because of its low melting point it liquifies instantly under grinding pressure. It solidifies as the point of grinding pressure is passed and the heat absorbed in making the product a liquid is transmitted away from the grinding body or the substance being ground. The elimination of heat also eliminates the factors which cause loading. The manufacturer claims his product produces the effect of a wet grind on a dry surface.

The standard rule of application is to apply a film of No-Load that is no thicker than the depth of the pores in the abrasive. The high surface tension of the material tends to prohibit the penetration of the abrased particles and they are thrown free, preventing loading.

The treatment cannot be used in the presence of grease and soluble oil, nor

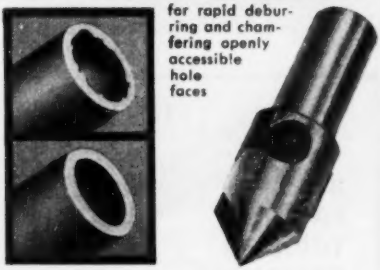
NOW . . . a new principle . . . a new approach to rapid DEBURRING and CHAMFERING of inside and outside diameters

NOBUROD . . . . . .



for rapid deburring and chamfering the outer edges of rods, tubes and bosses

. . . . NOBURSINK



for rapid deburring and chamfering openly accessible hole faces

Companion tools—to provide greatly improved work quality, faster and easier than ever before. Low torque design permits rapid off-hand work piece handling without chatter—even on large diameters. Both tools work equally well on all metals. Will accommodate a wide range of work size. Furnished 90° included angle (produces 45 chamfer).

WRITE TODAY FOR FULL DETAILS!!

NO/BUR TOOLS

NOBUR MFG. CO.

717 No. Victory Boulevard, Burbank, California

with belts using an animal glue as a bonding agent. The No-Load Co., Dept. BB, Clyde, Ohio.

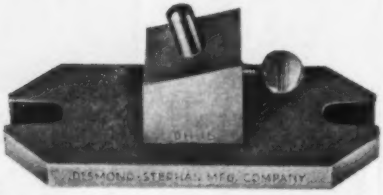
Use ACTION Card, opposite page 64. Encircle No. 10

Diamond holder for surface grinders

D-H No. 15, a diamond nib holder to be used on surface grinders, allows the nib to be brought in contact with the wheel at a 15° angle, thereby restoring the accuracy to cutting action of the grinding wheel, it is claimed. It allows for hand turning the nib, constantly maintaining a point on the diamond.

Holder can be bolted directly to the table or used on a magnetic chuck. The Desmond-Stephan Mfg. Co., 319 S. Walnut St., Urbana, Ohio.

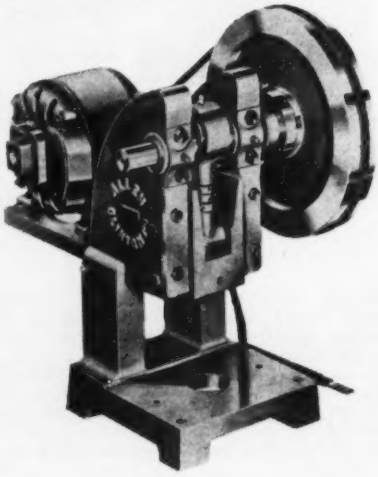
Use ACTION Card, opposite page 64. Encircle No. 11



Bench type one-ton punch press

A power bench type one-ton punch press has been developed by Alva F. Allen, Dept. MTB, Clinton, Mo.

One of the features of the machine is



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ALL IN ONE TOOLHEAD

A Boring Head that Won't Face is Not Complete

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CHANDLER TOOL CO.
MUNCIE, INDIANA

COMBINED BORING & FACING TOOL HEADS

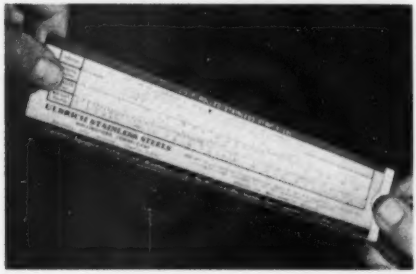
Chandler-Duplex

a new, simple single pin clutch. It gives positive clutching action, the manufacturer claims, and is operated by a hand lever. On continuous operation, the punch press has a capacity of up to 200 operations per minute. It requires only a ¼ to ½ hp motor.

Use ACTION Card, opposite page 64. Encircle No. 12

Stainless steel calculator

A slide type calculator to facilitate purchases of stainless steel strip uses as variables the length and weight of cold rolled strip and translates into pounds any length and width according to its gauge. The calculator indicates widths from ⅛" to 12", lengths from 100' to 10,000', and gauges from .003 through .150.



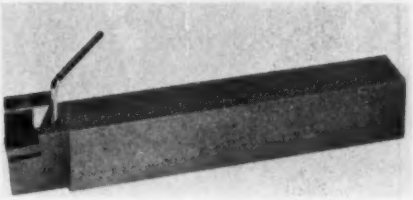
On the reverse side is included a slide table to determine the weight of stainless coil steel. Ulbrich Stainless Steels, Dept. B, Wallingford, Conn.

Use ACTION Card, opposite page 64. Encircle No. 13

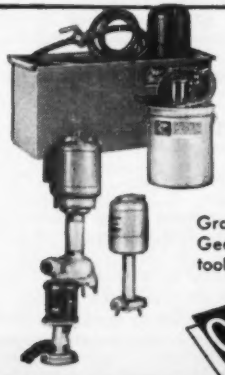
Tool holder for throw-away blanks

The Flash Carbide Tool Co., Dept. BB, 5311 W. Diversey Ave., Chicago 39, Ill., has announced its "Toolholder" for throwaway blanks in triangular, square and round shapes supplied in negative and neutral rake.

Buying tips only means lowered tooling cost, smaller inventories, the manufacturer claims. Carbide is fully sup-



Only... GRAYMILLS COOLANT PUMPS give you ALL these advantages



- Complete systems, with fittings, to fit any standard machine tool
- Easily installed—in a manner of minutes
- A size for every need—38 standard models—Pumps only or Pump and Tank Units
- Can be used with liquids bearing abrasives
- Dependable—long wearing—economical to use
- Stocked by distributors everywhere

Graymills Centrifugal pumps, for high volume at low pressures, or Graymills Gear pumps where high pressures are desired, are ideal for every machine tool application—for coolants, oils and compounds. Tank capacities range from 2 to 128 gals. Motors are of nationally known quality in 1/25, ⅛, ¼ and ½ H.P., totally enclosed or drip-proof.

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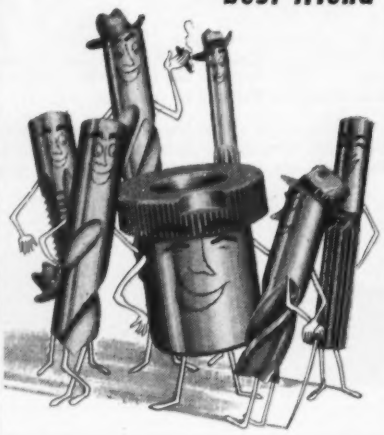
UNIVERSAL DRILL BUSHINGS

the production-tools' best friend



reduce tool wear • help prevent tool breakage • prolong tool life

Universal Bushings help keep tool costs down for several reasons: their superfinish bore helps reduce tool wear • their blended radius helps prevent tool hang-up and breakage • their 100% concentricity and hardness tests insure accuracy and uniform high quality • their knurled heads provide quick, sure grip • available in a complete range of standard diameters and lengths • For complete information, write to the office nearest you—Universal Engineering Sales Co., 1060 Broad St., Newark 2, N. J.; 5035 Sixth Avenue, Kenosha, Wis. — or the home office.

UNIVERSAL ENGINEERING COMPANY

FRANKENMUTH 10, MICHIGAN

176-B

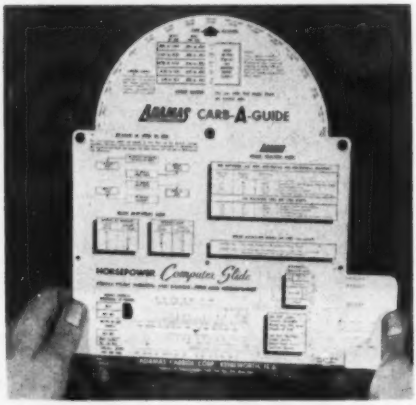
ported from directly beneath. One piece high alloy shank and component parts are heat treated to Rockwell C40-45. Hardened anvil backs up carbide in cut. Depth of cut is limited by size of insert only.

Use ACTION Card, opposite page 64. Encircle No. 14

Carbide application chart

Detailed carbide application information is provided in a combination dial and slide chart, the Adamas Carb-A-Guide.

By turning the dial to the type material to be machined it shows the proper speed, carbide grade, tool angles and chip-



breaker dimensions. How to make necessary changes in speed, feed and grade, speed conversion slide, milling feed slide and horsepower computer slide are also included. Adamas Carbide Corp., Dept. BB, Kenilworth, N. J.

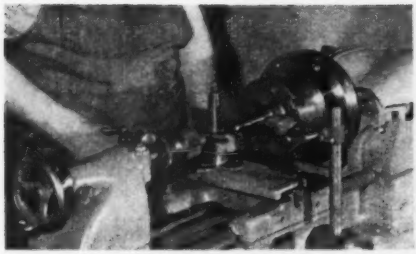
Use ACTION Card, opposite page 64. Encircle No. 15

Truing attachment ends trial and error

The Sanford Mfg. Corp., 1020A Commerce Ave., Union, N.J., has announced a precision attachment with which any lathe chuck, face plate or special fixture can be used to provide concentricity. Workpiece tolerance to within .0001" total indicator runout is claimed.

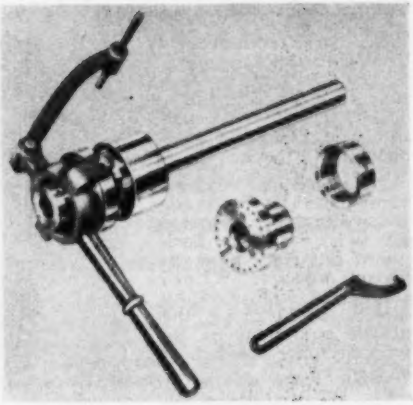
The Sanford Auto-Truer is said to eliminate trial and error in the truing process. The device is mounted on the lathe spindle, then the lathe chuck, face plate or special fixture is mounted upon the Auto-Truer.

The workpiece is trued by bringing



pressure against it with a follower while the lathe is running. This pressure causes the unit to shift its center until true center is indicated. The lathe is stopped and the Auto-Truer is locked into position.

Use ACTION Card, opposite page 64. Encircle No. 16



Collet closer increases lathe production

The collet closer recently announced by Precision Processing Co., Dept. BB, 3155 Verdugo Rd., Los Angeles, Calif., is said to increase lathe production by permitting feeding and releasing of bar stock through the collet without stopping the lathe. Gripping action is adjustable to desired tension without loss of time, it is claimed.

The closer will feed any length stock from 1/64" to 1" dia. through the spindle. Step collets can be made to accommodate larger diameters and used for second operations only. The cam is ball-bearing mounted.

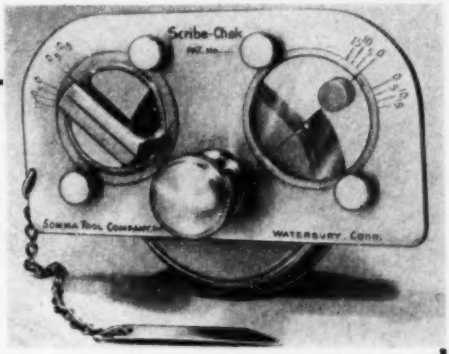
Use ACTION Card, opposite page 64. Encircle No. 17

Scribe-Chek

CUTTING EDGE GAGE . . .

FEATURES

- Simple operation, even inexperienced men can sharpen tools properly.
- Eliminates costly "cut and try" tool Sharpening methods—pays for itself many times over.
- Gives longer tool life and therefore more correct pieces per grind.
- Inexpensive—High Precision Instrument.



SCRIBE-CHEK . . . TAKES THE GUESSWORK OUT OF SHARPENING CIRCULAR FORM TOOLS.

At last . . . a Gage to eliminate your tool sharpening problems. No more trusting the human eye — with the Scribe-Chek gage you can scribe the exact cutting edge required on the tool (with or without top rake) and also visually check the result after sharpening.

West Coast Warehouse: 576 No. Prairie, Hawthorne, California

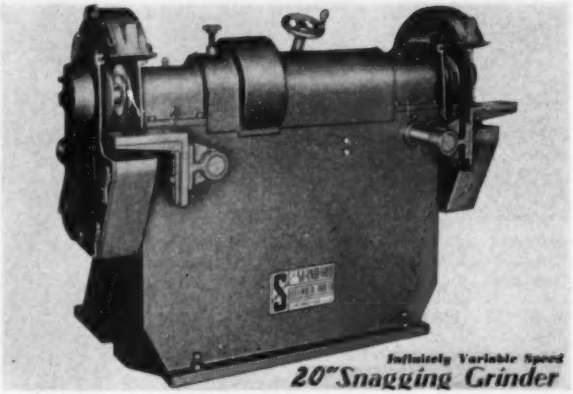
SOMMA TOOL COMPANY Inc.

Manufacturers of Standard and Special Precision Form Tools

21 BROWN STREET • WATERBURY, CONN.

Double end speed snagging grinder

The Standard Electrical Tool Co., 2486 River Rd., Cincinnati 4, Ohio, has announced the Type 10GVS double end infinitely variable speed snagging grinder.



The guards are of structural plate steel with adjustment to compensate for wheel wear. Each guard has stationary exhaust outlet. Wheel change is facilitated by latches securing the hinged guard covers. No wrenches are needed, it is claimed.

The 10 hp motor on the rear of the base moves in a dovetailed slide which has an adjusting gib for rigidity. Equipment includes magnetic starter with separate start-stop push-button station.

This grinder accommodates two 20" dia. x 3" face grinding wheels and the infinitely variable speed drive is claimed to maintain a constant cutting speed throughout wheel life. Simultaneous guard adjustment and speed change is accomplished by turning the hand wheel.

The design for vertical bond wheels will maintain 6500 sfpm, while the arrangement for resinoid bond wheels will maintain 9500 sfpm.

Use ACTION Card, opposite page 64. Encircle No. 18

American Standard Perforators

For Improved Production Schedules - Reduced Die & Maintenance Costs.

Precision Ground For High Production. In All Sizes .040 to .875

Use Them In The Dies You Make, Specify Them In The Dies You Buy.

Available From Stock For Immediate Delivery.

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AMERICAN STANDARD PERFORATORS

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Commander SELECT A SPINDLE

DUAL SPEED DRILL PRESS TURRET

DRILLS, REAMS, TAPS ON 1 DRILL PRESS SPINDLE!

• Fits Any Drill Press • Increases Production

• Reduces machine, fixture costs

Commander Select-A-Spindle permits you to do 3 operations on a single drill press spindle . . . save time . . . eliminate multiple handling of piece parts, speed production and reduce overall costs. Dual Speed Select-A-Spindle permits selection of proper speed for each operation. Quick, positive hand indexing positions each tool accurately for sequence operations. Select-A-Spindle is built to tap with any 1, 2, or all 3 spindles to the full capacity of the unit. Adjustable torque control spindles for protection of taps to ¼" available.

Write for illustrated circular on Select-A-Spindle, other Commander Production Tools and name of your nearby Commander Distributor

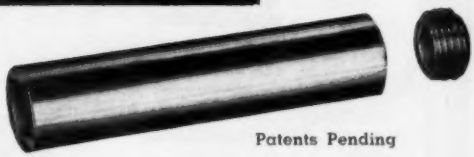
Commander MFG. CO.

4227 W. KINZIE STREET, CHICAGO
PRODUCT OF COMMANDER
BUILDER OF PRODUCTION TOOLS

How SQUARE HOLED SLEEVES SPEED UP TOOL-MAKING!

One of the most difficult problems in tool making can be solved easily and quickly with Sturdy Square Holed Sleeves. The perfection of broached square holes can be had in boring bars, milling cutters and many other applications at a small fraction of the cost of imperfect hand-made square holes. The Sturdy Square Holed Sleeve consists of a round sleeve with a perfectly square hole broached through the center. This hole is tapped at one end to receive a back-up screw which is furnished with the Sleeve. The Sleeve can be sweated or pressed into a drilled and reamed hole to make a perfectly square accurate hole in a very few minutes.

The Sturdy Square Holed Sleeve will save you many hours and many dollars in the making of boring bars, tool holders and other tools requiring square holes.



Patents Pending

SLEEVES MADE IN FOLLOWING SIZES:
3-16, 1-4, 5-16, 3-8, 7-16, 1-2, 5-8, 3-4, 1"

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Save Costly Regrinding!

Anderson

NEW, IMPROVED HAND SCRAPER

After the original regrinding most users of this new Anderson hand scraper find that only honing is necessary. Judge for yourself: Order as many Model 5-D scrapers as you want. We'll send them promptly. Use them a full week . . . if they don't live up to all your expectations, send them back to us for refund.

Faster Cutting
Easier to Use
Just the Right Spring
Palm Fitting Grip
Light in Weight
18" — 20" — 22" lengths

$5.80... with high speed steel blades
$8.50... with carbide-tipped blades
$1.50... for rubber bumper shown below

ORDER AS MANY AS YOU NEED
MONEY-BACK GUARANTEE

Indicate choice of high-speed steel or carbide-tipped blades, and 18", 20", or 22" lengths. We suggest you include rubber bumpers in your order. Write today!

ANDERSON
BROS. MFG. CO.
1907 Kishwaukee St.
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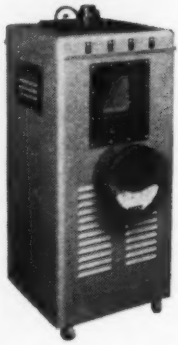
Test unit suitable for low, high temperature operation



A test unit, primarily for low temperature testing, but adaptable to high temperature operations, has been announced by Cincinnati Sub-Zero Products, Dept. B, 3930 Reading Rd., Cincinnati 29, Ohio. The basic cold unit, designated the A-120-1, has a capacity of 1 cubic foot.

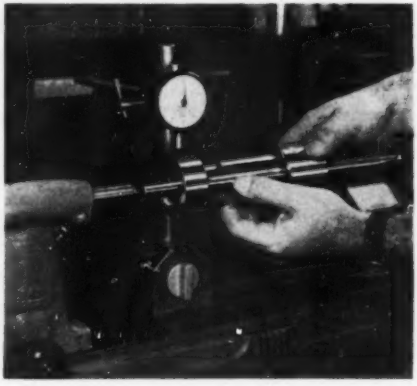
The addition of an explosionproof 500-watt heater, available as a test accessory, extends the temperature range of the basic unit from -120° F to +200° F to permit testing operations at high temperatures.

Unit is 43" high, 20" long and 18" wide, weighs approximately 500 lb. Testing chamber is 12" x 12" x 12" deep, having a capacity of 400 btu per hour at -120° F, with convection fluid in chamber.

Use ACTION Card, opposite page 64. Encircle No. 19

Hand lapped universal expanding mandrel

The Le Count Tool Works, Inc., Dept. BB, 390 Capitol Ave., Hartford, Conn., has announced a new edition to its line of Count-Centric universal expanding mandrels, the Type S Super, which has



an accuracy and concentricity within .0002" total indicator reading.

The new model is similar in design to the Type A, and contains all of the earlier model's construction features. The super-accuracy is obtained by hand lapping the vital components of the tool. Previously this fine tolerance was obtainable only on special mandrels, but is now on a standard line of 11 tools for all size arbors from ⅜" through 7".

Use ACTION Card, opposite page 64. Encircle No. 20

Universal joint line

Simplicity and durability are characteristics claimed for the universal joint manufactured by Curtis Universal Joint Co., Inc., 16 Birnie Ave., Springfield 3, Mass.

Fourteen sizes, hub diameters from ⅜" to 4", are carried in stock. Standard joints will operate through angles up to 37°, although the company does not recommend angles greater than 30° unless special design is employed, in which case angles up to 45° are possible.

"Telltale" lock ring snaps into small pin groove and fits recess of center block. This is said to insure firm lock-up of entire assembly, makes disassembly and reassembly quick and easy.

Use ACTION Card, opposite page 64. Encircle No. 75

Tool holders now feature height gage, insert removal slot

A new design feature for more rapid insert setup, the band type Multicut tool holder now incorporates a precision ground carbide height gage. Permanently brazed to the holder adjacent to the insert slot, the flush gage is claimed to eliminate the need for additional rules or gages.

The operator raises the insert until it is flush with the gage. By feeling the top of the insert and flush gage with the finger tip, he can set the insert accurately to 1/1000".

Another new feature is an elliptical slot for easier insert removal. Wesson Co., Dept. B, 1220 Woodward Heights Blvd., Detroit (Ferndale 20), Mich.

Use ACTION Card, opposite page 64. Encircle No. 76

Sealed live bushings

New piloting applications of their sealed live roller bearing bushings on older model milling machines to increase competitive levels have been announced by the J. G. Jergens Div. of Donley Products, Inc., Dept. BB, 11106 Avon Ave., Cleveland, Ohio.

When installed in the outboard support,

WALDEN SOFT-FACED HAMMERHEADS

Strong steel cup fitted with a COPPER, LEAD or PLASTIC INSERT — fits over your own hammerhead and is held firmly in place by taut steel coil-spring as shown.

PATENT NOS 251543 AND 2499802 OTHER PATS PEND

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WORLD-FAMOUS ✦ HAND TOOLS FOR OVER 50 YEARS

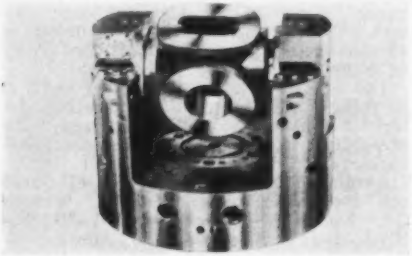
STEVENS WALDEN Inc.
471 SHREWSBURY STREET ✦ WORCESTER, MASSACHUSETTS

203-4

bushings permit the use of carbide tools on old equipment up to full capacity giving heavier cuts at higher speeds, it is claimed.

When required they can be furnished arranged for slip removable bushings allowing the use of a wide range of arbor diameters.

Use ACTION Card, opposite page 64. Encircle No. 77

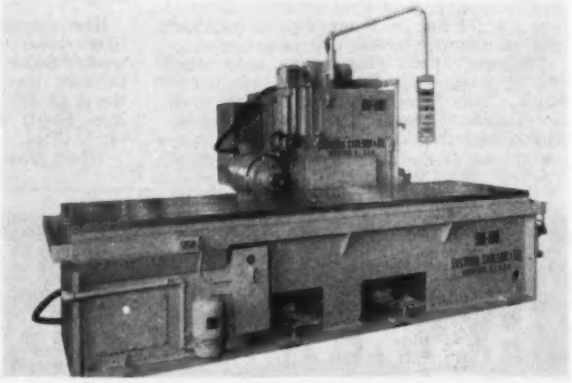


This 2-jaw power or scroll operated indexing chuck holds workpieces having opposing and angular surfaces in specific relation to one another, thereby permitting precision machining of all faces without having to unload and rechuck the workpiece, which is revolved from station to station for each machining operation. The Cushman Chuck Co., 806 Windsor St., Hartford, Conn.

Use ACTION Card, opposite page 64. Encircle No. 78

Scarf mill for nonferrous metals

Ekstrom, Carlson & Co., 1400 Railroad Ave., Dept. M-3, Rockford, Ill., has announced the No. SM-100 open-side scarf and edge milling machine, intended for use in nonferrous metals. Mounted on a vertical column, the machine's horizontal spindle head can be adjusted to tilt a maximum of 30° either above or below the center line. Head is driven by a 15/30 hp, 1800/3600 rpm motor and equipped with a No. 50 standard milling machine taper.



Work table surface measures 36″ by 144″, is furnished with three standard T-slots. Travelling on one V and one flat way, the vertical column incorporates a variable feed rate ranging from 10″ to 200″ per minute.

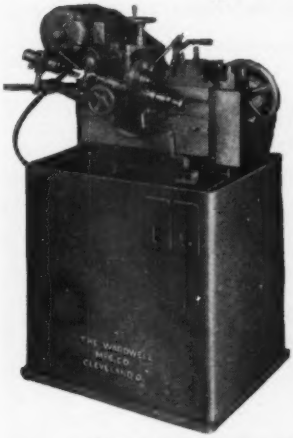
Use ACTION Card, opposite page 64. Encircle No. 79

This electric recirculating oven has a maximum temperature capacity of 650° F. Open type elements are located in the bottom of the unit, and the air is recirculated by one or two stainless steel blowers, depending upon the oven's size. The motor to drive the blowers is installed in a ventilated cabinet. Any type of temperature control can be furnished. Control shown is the mercury actuated type.

Use ACTION Card, opposite page 64. Encircle No. 80

Sharpens Taps, Saws

grinds straight flutes



A versatile straight flute grinder that will:

a) Sharpen taps
b) Sharpen Saws in Gangs
c) Sharpen Reamers
d) Grinds straight flutes from solid
e) Spiral points
f) Sharpen milling cutters, Woodruff key cutters

Automatically indexes, no special skill needed!

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Manufacturing Co.
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Maker of Largest Line of Saw and Tool Sharpening Machines

BLUE VALLEY FLANGING MACHINES

No. 1 10 gauge capacity combination circle shear and flanger; from 14" to 6' diameter flat with support; 12' diameter less support.

No. 3 ¼" capacity flanging flat heads from 18" to 12'.

No. 4 ⅜" capacity flanging flat heads 20" to 12'; also handles standard dished heads up to 12' dia.

No. 5 ½" capacity flanging flat heads 24" to 20'; also handles dished heads up to 12' dia.

No. 6 ¾" capacity for flanging flat heads 28" to 20'; also handles dished heads up to 12" dia.

No. 53 Elliptical Head Shear and Flanging Machine which operates from the same controls. Head is sheared to size and shape before flanging from same template without removing work from the machine.

Shown is Model No. 53 Elliptical Head Shear and Flanging Machine which operates from the same controls. Head is sheared to size and shape before flanging from the same template without removing work from the machine.

BLUE VALLEY MACHINE & MFG. CO.

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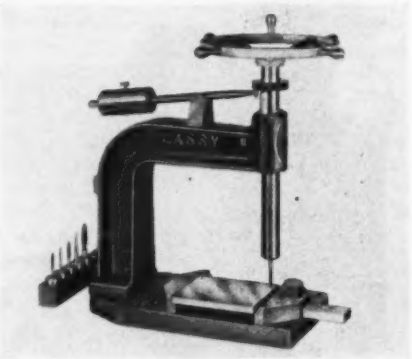
HOGGSON & PETTIS MFG. CO.
141H Brewery St., New Haven 7, Conn.

Hand tapper is super-sensitive

The Model 10-S hand tapper is a highly sensitive tapping machine with finger tip control, recommended for taps from No. 0 to 5/8".

The spindle balancing attachment pro-



vides a free floating spindle, eliminating down pressure caused by weight of spindle assembly and operator's hand. A slight downward pressure starts tap cutting. Lassy Tool Co., 108 Bohemia St., Plainville, Conn.

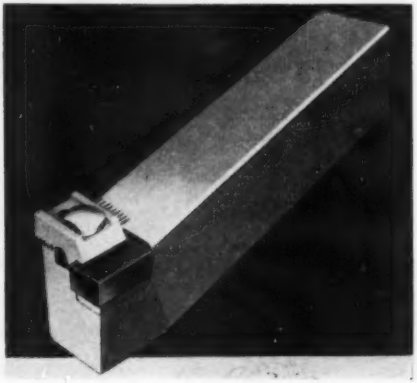
Use ACTION Card, opposite page 64. Encircle No. 81

Turning tools line improved

The Gairing Tool Co., Dept. MTB, P.O. Box 478, Detroit, has announced an improved line of Chip-Hog turning tools.

Carbide inserts are clamped to high alloy steel shanks, are adjustable two ways, quickly replaced, and available with preformed front and side clearance angles.

Use ACTION Card, opposite page 64. Encircle No. 82



Projector has vertical or horizontal lens systems

Stocker & Yale, Inc., Dept. BB, Marblehead, Mass., has announced its Model 67 optical projector, embodying either vertical or horizontal lens systems, or both, in combination with contour or front surface projection.

Screen size is 7" dia., choice of opaque screen in enclosed hood or ground glass screen which can be used in conjunction with overlay charts.

Working table operates on fine-pitch screw for accurate vertical travel. Micrometer measuring stage, graduated in .0001", attaches to table.

Use ACTION Card, opposite page 64. Encircle No. 83

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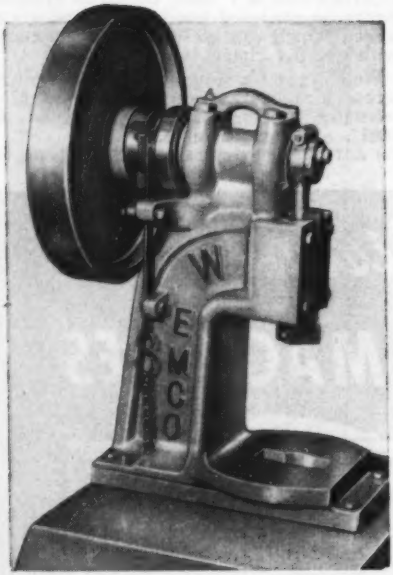

EMCO "W", bench type, 5-ton; also larger EMCO "X", 10-ton. Both sizes also stand-mounted. With or without motor drive.

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are SPEEDY and SAFE

Versatile EMCO presses excel for punching, forming, stenciling and riveting metal, leather, plastics and other non-metallic materials. Up to 300 operations per minute. "Big machine" speed, strength, rigidity, accuracy, endurance. Compact, fool-proof; simple design — easy to operate. Thousands of EMCOS in money-making use testify to Klaas' dependability since 1921.

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Cleveland 25, Ohio

KLAAS-BUILT

Combined boring and facing toolhead

The Chandler-Duplex combined boring and facing toolhead makes possible boring, facing, turning, grooving and undercutting all in one setup. The unit features power feed for facing, longer slide travel, extremely fine adjustment, tee-slot positioning of cutting bar, universal range and adaptability.

The power feed movement of the tool

slide while the tool head is in rotation is accomplished simply by holding the knurled feed ring stationary while the tool head revolves. Thus the cutting tool is fed steadily and uniformly across the work surface for facing cuts and grooving.

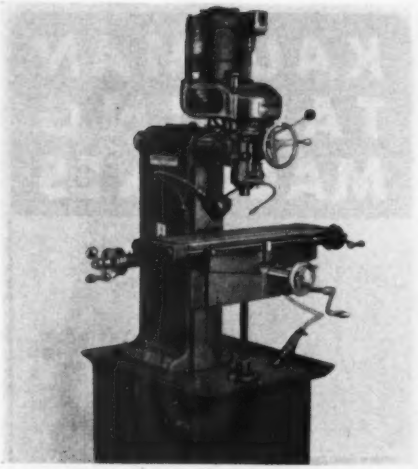
An adjustable stop controls depth of cut when grooving and when facing or undercutting to a shoulder. Manufactured by Chandler Tool Co., Dept. BB, Muncie, Ind.

Use ACTION Card, opposite page 64. Encircle No. 22

New Crowningshield vertical miller

Said to be a practical miller for both production and tool room milling, built for flexibility, ample range, and versatility; available with a Bridgeport Model "M" milling and drilling attachment and adapters as well as the Crowningshield milling unit or without any head for those having a spare that will fit this miller; can be fitted with air feed to the table if desired.

Some specifications include: table size 8⅛" x 28"; table travel (long.) 16¾"; vertical feed with Bridgeport head 13½"; vertical feed with Crowningshield head 15"; cross feed 6"; max. dist. spindle to table—Bridgeport 13½"; Crowningshield



15"; spindle speeds—Bridgeport 275-4250, Crowningshield 330-2900; ½ hp — 3 hp motors with reversing switch used; weight with vertical head approx. 800 lbs. Crowningshield-Harris Co., Dept. BB, Greenfield, Mass.

Use ACTION Card, opposite page 64. Encircle No. 23

Hinged Hammer Moulds

1, 2½ and 5 lb. sizes—order your alloy lead hammer requirements from your machine tool supply house

or direct from:

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All collets in hexagon, square and round.

KLUTCH-KOLLET

Step collet for accurate chucking to 2¾" dia. Soft head for easy boring. Lowest price on market! Models 3AT, 3C, 5C.

FOR ATLAS • LOGAN • SOUTH BEND CRAFTSMAN • SHELDON LATHES, ETC.

Positive grip on undersize, oversize or standard diameter work! Patented coordinate cams eliminate fingers.

Let us quote on your quantity orders for any type of collet, live center or other machine tool attachment!

HAND DRAWBAR ½" cap.

LIVE CENTER (Ball Bearing) Double sealed for accuracy.

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QUICK CHUCK
cuts drill press costs!

SAVES TIME—Click! one tool's out. Snap! another's in. With an AMF Wahlstrom Chuck there's no waiting for the spindle to stop! Simple hand motions do the job. No more keys, collets or wrenches to fit or to hunt for.

SAVES MACHINES—A single-spindle drill press equipped with an AMF Wahlstrom Instant-Change Chuck does the work of several! Makes it practical to drill, ream and counterbore different size holes **without moving the work.**

SAVES TOOLS—Does not chew up shanks of costly tools. Wahlstrom's four hardened and ground jaws grip without slip . . . the greater the load, the tighter the grip. Drill on left is still unmarred after 289 changes in an AMF Wahlstrom chuck.

Ask your distributor for a demonstration or write us for folder W-50.

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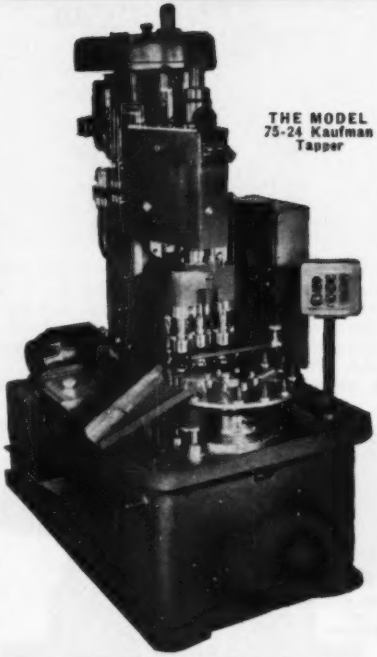
KAUFMAN TAPPING MACHINES



THE MODEL 75-24 Kaufman Tapper

Built For Specific Production Jobs

- **Single or Multiple Operations**
- **Precision Depth Control**
- **Non-reversing Motor Drives**
- **Pressure Lubricated Lead Screws**
- **Fast, Accurate, Rugged Index**
- **Other Head Units Available**

And Many Other Worthwhile Features

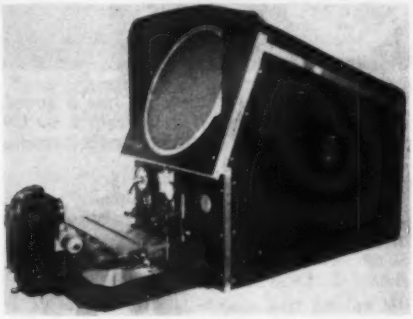
Send prints and samples of your work for further information and recommendations on how Kaufman Tapping Machines can reduce your production costs.

Catalogs Number 754 and 1153 Mailed on Request

KAUFMAN MFG. CO.
546 SOUTH 29TH STREET
MANITOWOC, WISCONSIN

Bench type optical comparator

A new horizontal bench type optical comparator, Model L-400, offered by the Portman Instrument Co., Town Dock Road, New Rochelle, N.Y., features large work area. The plain work stage furnished on the standard model is 18" long. There is a 6" work space from the lens



system center line to the plain stage top working surface.

A universal (coordinate type) measuring stage, available as an accessory, is of ample size: 18" long, 6" wide and providing 6" of longitudinal travel. The universal stage also provides traverse (focusing) movement, vertical positioning, and may be set to helix angles either left or right of center.

Comparator features the long focal length Portman Multi-Phase optical system so that it may be used on all types of work. Lenses to provide magnifications of 10X, 20X, 25X, 31¼X, 40X, 50X, 62½X and 100X are available as standard. The new high-powered light source has a variable volume control, is blower cooled and provides uniform illumination over the entire 16" diameter image screen. The condenser lens unit in the light house is also equipped with three color filters and mounting ring for proper screen contrast. The screen is correctly positioned for eye-level observation without reflection or glare and does not require hoods or curtains under prevailing lighting conditions.

Use ACTION Card, opposite page 64. Encircle No. 46

New model Di-Profiler

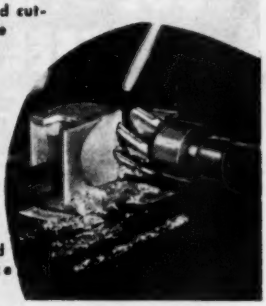
The Model FNC Di-Profiler may be used with any suitable flexible drive and without an intermediary sleeve coupling, it is claimed.

This reciprocating hand machine, for

DoALL Carbide Tipped END MILLS

The Finest You Can Use

- Diamond ground cutting edges make perfect cuts.
- Hardened and ground shanks—burrs and nicks eliminated.
- Lapped centers—regrind with accuracy.
- Polished ground flutes reduce clogging.



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DoAll Stocks All Styles of Milling Cutters, but only one kind . . . the FINEST!

31

Sensational new *VIBRA-FORGE** principle assures unbreakable welds every time!

BREN-WELD

PORTABLE BAND SAW BLADE **WELDER**

. . . With Built-in Grinder

3/4" capacity

If you've been troubled with band saw blade breakage investigate this Bren/Weld unit built on the new Vibra-Forge principle. It gives you:

- PERFECT WELDS.
- NO BREAKAGE.
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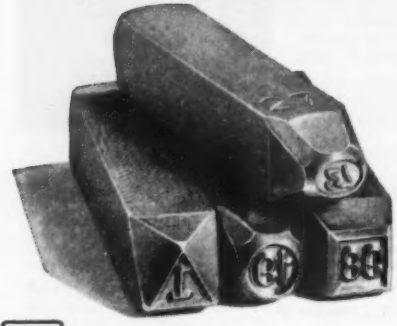

98 3/16" 98 1/4" 98 3/16" 98 5/32"

ACTUAL SIZE OF IMPRESSION

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. . . for the mark of controlled quality on your product.

YOUR CUSTOMERS recognize your inspection mark as a symbol of insured dependability.

Identification numbers from (1) to (99), inside standard 5/32, 3/16, 1/4 and 5/16 inch borders. Special sizes and symbols on request.

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NEW METHOD STEEL STAMPS, INC.

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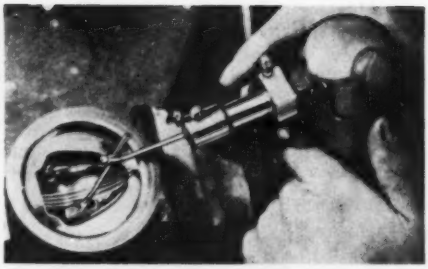


cutting, roughing, finishing, has a speed of reciprocation adjustable from 0 to 100 strokes per second and a controlled stroke variable from 0 to ¼".

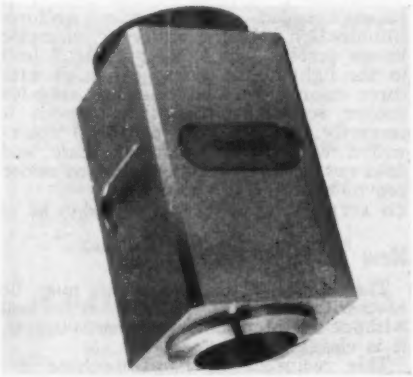
Two new angle extension rods permit versatility of the unit for finishing corners, small areas, grooves, fine contour. Distributor is Engis Equipment Co., Dept. B, 431 S. Dearborn St., Chicago 5, Ill.

Use ACTION Card, opposite page 64. Encircle No. 47

Indexing fixture simplifies setups

Accurate 90° indexing of round stock for cutting squares, splines, keyways, flutes, special tools, etc., is said to be simplified with the Brown block chuck, manufactured by M and H Products, Inc., Box 1057, Danbury, Conn. A hardened and ground steel block with a centered collet seat and drawnut, it is square and parallel within .0005".

With a workpiece clamped in the collet, the block is held in position by a 4-jaw chuck, magnetic chuck or vise and flopped 90° or 100° after each cut is



finished. There is no need to release the work from the collet until the job is done.

Placing the block chuck on a magnetic sine bar or in a universal vise enables the user to index compound angles, such as are required for tapered square shanks and tapered fluting. Using it in a common or magnetic V-block doubles its indexing stations, permitting octagonal indexing and other work involving increments of rotation of 45°.

Use ACTION Card, opposite page 64. Encircle No. 48

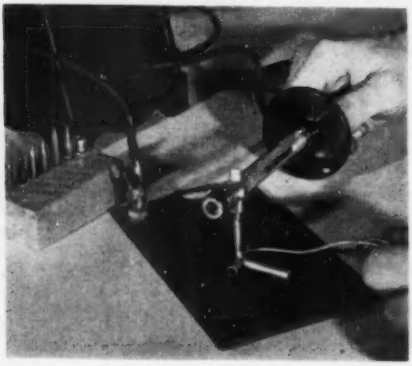
New changeable carbon tip electric spot solderer gives intense concentrated heat instantly, on low voltage

The new Newage Lorsol electric spot solderer claims two main features designed for faster, more efficient, economical soldering.

This carbon tipped tool operates on low voltage supplied through an A.C. single phase transformer which gives intense concentrated heat the instant the tool contacts the work to be soldered. The heat continues at this high level during the entire soldering operation and shuts off automatically when contact between the tool and the work is broken.

It is equipped with a synthetic insulating handle the end of which is formed to act as a shield against the intense heat developed. It is shockproof because of the low voltage used. The transformer gives six different heats.

The second advantage of the Newage Lorsol is that it can be fitted with two carbon tips at angles in addition to the end fitting. The carbon tips can be machined to any shape to facilitate work on unusual and difficult soldering work. The two angled tips can be used simul-



NEW DoALL High Speed Steel SAW BANDS

Demon HIGH-SPEED STEEL

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• Up to 30 times longer life!
• Full safety blade

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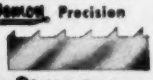
Demon Buttress

¼" to 1"
2 to 10 pitch

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REHNBERG-JACOBSON TAP UNITS

Self-contained Tap Units are fully-automatic with feed positively controlled by an accurate lead screw. Capacities in four sizes range from 5/16–18 and 1-1/4" stroke to 1-1/2–6 and 4" stroke.

These units are all available for quick delivery. You can mount them on structures of your own to make practical and efficient production machine tools.

Write for Literature

REHNBERG-JACOBSON MFG. COMPANY

DESIGNERS & BUILDERS OF SPECIAL MACHINERY

R-J

2135 KISHWAUKEE ST. ROCKFORD, ILLINOIS

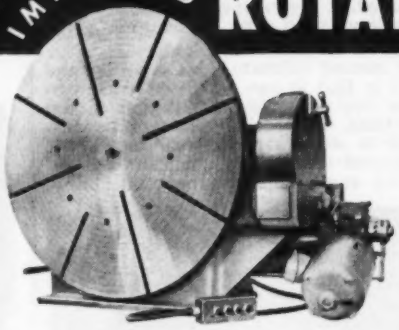
SEE THE **NEW** IMPROVED **ROTAB**

Inspection operations are simplified, providing closer quality control on radial and angular checking.

One feature is the addition of an optical micrometer microscope with glass vernier recticle which permits direct reading to 5 seconds of an arc.

Checking and measuring planes are conveniently positioned for easy reading.

New controls have been incorporated to simplify and speed the operation of ROTAB in all its movements.



Made in four sizes with 12", 24", 36" and 48" face plates.

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MACHINE PRODUCTS CORPORATION

6771 E. McNichols Rd. Dept. A Detroit 12, Mich.

taneously speeding and simplifying work normally difficult to handle.

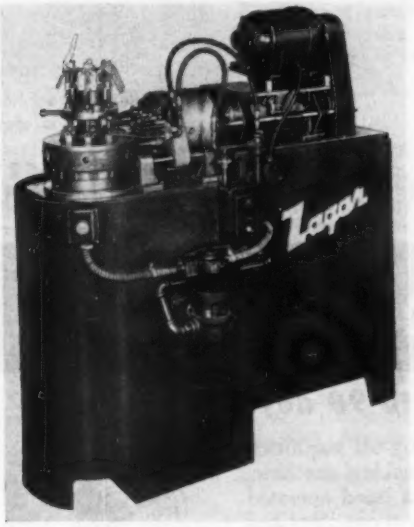
The carbons are supplied in three different sizes: 3/16", 1/4" and 5/16" diameter. Newage International Inc., Dept. B, 235 East 42nd St., New York 17, N.Y.

Use ACTION Card, opposite page 64. Encirle No. 49

Basic Zagar units perform special jobs

One of a series of machines for special purposes uses a Zagar hydraulic feed unit and a Zagar gearless drill head.

The feed unit includes a base which serves as a table for the manually operated six-station indexing fixture. While three stations are at drilling position, the remaining three are open for loading and unloading.



Feed units and drill heads are removable and can be used for other jobs with tooling changes. Feed units have a long stroke and a maximum of 7½ h.p. A basic tank is included with every unit and all feed units operate hydraulically.

Use ACTION Card, opposite page 64. Encirle No. 50

Five ton presses feature special ribbing construction

Model 5R five ton Rigid Rib press has ribbing construction so designed as to give the most rigidity and strength for the weight of the press, the manufac-

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XL TWIST DRILLS

Guaranteed to *last longer* than an ordinary drill!

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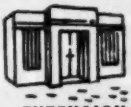

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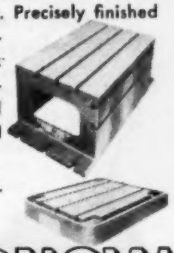

Send for bulletins BA-3-53 and 54.

Dept. MT

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MACHINE TOOLS
333 Old Hook Rd., Westwood, N.J. WEstwood 5-3271

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Procunier tappers are the solution to steadily rising production costs on many tapping operations. They have the unique construction features that permit inexperienced operators to tap like experts. In addition, they provide many extra hours of continuous, **accurate** tapping without frequent "down-time" interruptions, producing more pieces with fewer rejections, less spoilage and a minimum of broken taps.

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smaller, lighter, more accurate, taps close to walls.

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Will pay for itself in 60 to 90 days

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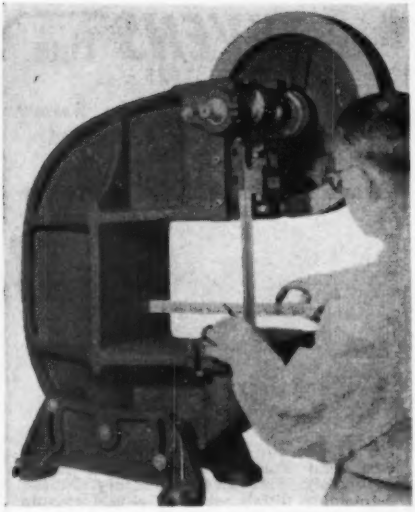
CHUCK DIVISION
THOMAS HOIST CO.
2- S. HOYNE CHICAGO 12, ILL.



turer claims.

Unit is a variable speed press with speeds from 90 to 285. It has a 130 lb., 18" dia. flywheel mounted on double roller bearing. A positive single trip is standard equipment and press can be converted to continuous by moving one lever; 1" or 1¼" standard stroke is optional. The depth of the throat from the center of the ram hole to the back is 12¾". The shut height (1" stroke) is 8½" to the bolster plate, adjustment up, ram down. The bolster plate is 1" thick. Strokes up to three inches are available. Tonnage is rated at 1" stroke. Floor legs can be furnished. Kenco Manufacturing Co., 5211½ Telegraph Rd., Los Angeles 22, Calif.

Use ACTION Card, opposite page 64. Encirle No. 51

High speed all steel press brake

A new press brake, manufactured by The Cincinnati Shaper Co., 1234 Garrard, Cincinnati 25, Ohio, for high speed punching and automatic feeding applications, operates at 70 strokes per minute and is equipped with a specially arranged ram.

The machine has an all steel rolled plate construction with an interlocked frame, push button control to the ram adjustment, micrometer indicators on both ends of the machine, centerline loading, weld free joints, automatic pressure lubrication.

Additional features include the planing

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The Linley Jig Borer provides the means . . . at very low cost . . . of handling your most exacting requirements in precision. With it you can cut costs through having a tool exactly fitted to your small work . . . save your larger machines for larger work.

SPECIFICATIONS

Table Movement: 6"x10" Table Size: 7"x17½"

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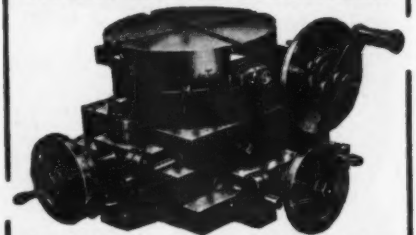

Made in larger size 12" dial type Rotary-compound table No. 2. Either unit usable separately. Five sizes of Rotary Tables. Adjustable tilting tables. Multiple spindle index centers. Screw head slotters. Vises.

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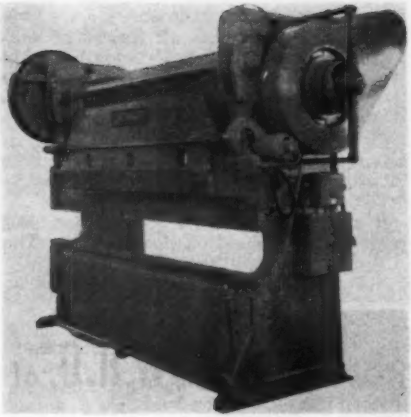

of a double hook tongue in the ram with the bed member doweled to the housings to withstand a twenty ton stripping load. This machine is an example of the special arrangements available on Cincinnati all steel press brakes.

Use ACTION Card, opposite page 64. Encircle No. 116

Tap bushing comes in five o.d. sizes

The Byco tap bushing is chrome hardened, is easy to install and easy to disengage, the manufacturer claims.

It has a square broached hole to fit and drive all standard diameter taps from 0 to $\frac{5}{8}$" and pipe taps from $\frac{1}{8}$" to 1". The five o.d. sizes fit $\frac{1}{2}$", $\frac{3}{8}$", 1" $1\frac{1}{4}$" and $1\frac{1}{2}$" tap holders. Byco Industries, Dept. MTBB, 2300 E. 31st St., Minneapolis, Minn.

Use ACTION Card, opposite page 64. Encircle No. 117

Air-operated impact hammer

A new air-operated impact machine, the Model 2-CSB, has been developed by Heidrich-Nourse Co., Dept. B, 631 East Third St., Los Angeles 13.

A smaller and simplified version of the Model 3-VS, it is essentially a single-stroke air hammer, with the hammer moving within a closed cylinder and the impact force transmitted through a tool-holding chuck.

There are some mechanical differences from the Model 3-VS. The length of hammer stroke is constant, and force of impact is adjusted by regulating the volume of the incoming air. Surge chamber is at the upper end of the cylinder. Impact range is from zero to approximately 7,000

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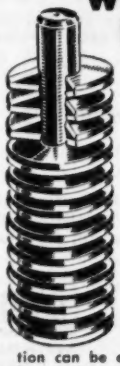

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8. Excellent space disposition.
9. Spring pressure, Spring length and Spring deflection can be easily determined for the same Spring size or can be changed by lengthening or shortening of the Spring columns or by multiple stacking. In special cases the character line can be made to divert from its usual straight form by diversified stacking.
10. Most Spring sizes available from stock.

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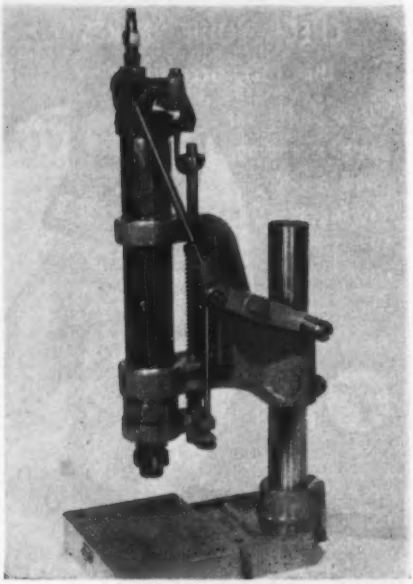

lb., as compared to 30,000 lb. for Model 3-VS.

A foot pedal lowers the operating cylinder until the tool makes contact with the work. After contact a further light pedal pressure triggers the hammer stroke by opening the air valve.

Use ACTION Card, opposite page 64. Emcircle No. 54

Surface grinder attachment features sine bar for precision settings

Cylindex, a surface grinder attachment to perform cylindrical and indexing grinding, will also grind tapers and flats with high accuracy, it is claimed.

The attachment fits all makes of surface grinders and is easily handled, only weighing 23 lb. It can normally be set up in five to ten minutes. Motor is 1/20th hp, totally enclosed.

Cylindex features a sine bar for precision settings and screw adjustments facilitating taper grinding up to approximately plus or minus 20 degrees.

It will hold sustained accuracy of .0002 with the work held on dead centers. The

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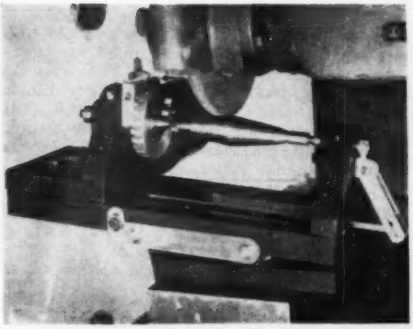


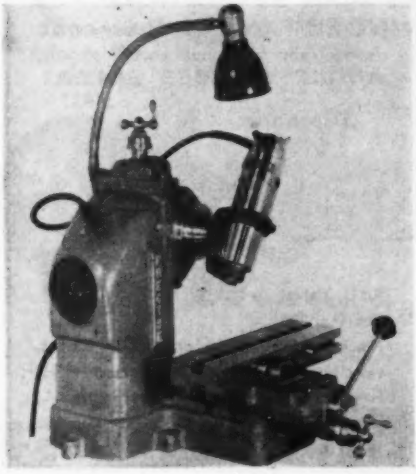
tailstock release can be operated from the front of the surface grinder. Length between centers is 7¼", a swing of 6" is allowed. Through the use of a 4-jaw chuck, a standard accessory, 2" dia. stock may be ground. Binghamton Die & Machine, Inc., 44-B Charlotte St., Binghamton, N.Y.

Use ACTION Card, opposite page 64. Encircle No. 55

Small bench mill offers sensitivity, high spindle speeds

The Precise high rpm universal bench mill is claimed to be sensitive and small enough to allow proper control in handling of small workpieces. High spindle speeds are backed up by accurate quills and sufficient horsepower to maintain speeds under production loads.

Capable of doing 45,000 rpm, the ma-



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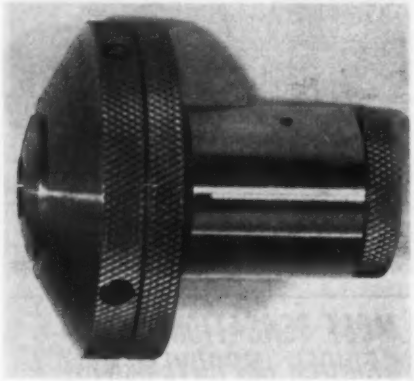
chine is especially suited for the use of tungsten carbide midget mills. Precise Products Corp., 1350 Clark St., Racine, Wis.

Use ACTION Card, opposite page 64. Encircle No. 56

Collet chuck widens scope of 5C Collets

The Hancock Chukollet, Hancock Mfg. Co., Inc., Dept. B, 1084 Martin Ave., Santa Clara, Calif., is a new collet chuck which makes standard 5C collets useful throughout the shop, the manufacturer claims.

The workpieces are not displaced as the collet is not drawn in when closing. An adjustable stop can be used for positive location of workpieces. Tool can be set at any angle by placing a v-block against one side in drill press and mill vise, or in any three or four-jaw chuck for turning on center or eccentric, in dividing heads, super spacers, etc.



The Chukollet is claimed to hold soft materials and threaded parts without damage, and to eliminate special tooling in numerous operations.

Use ACTION Card, opposite page 64. Encircle No. 57

Nibbler cuts 36 feet per minute

A revised sheet and plate cutting machine suitable for nibbling, beading, folding, slotting, channeling, doming, straight, circular, slot or louver cutting, etc., has been announced by Nord International Corp., 449-B Central Ave., Orange, N.J.

Designated as the Nord Model G Nibblex, it will cut 1/16" (16 ga.) sheet steel at the rate of 36 ft. or more per minute. It is also fast for cutting cold rolled steel sheet up to ⅛" thick and can be used for heavier plates up to 3/16" thickness where production cutting is not required.

A circular cutting feature enables it to cut up to 28½" dia. circles, and by the attachment of a special fixture larger diameters up to several feet can be cut in a circular manner. Irregular shapes

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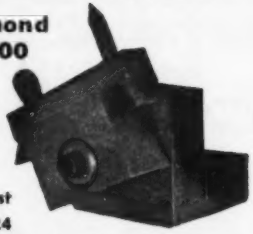

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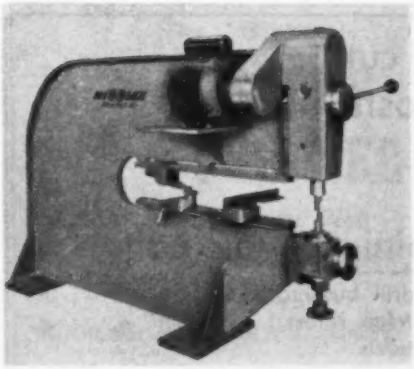

can be cut into steel plate of thicknesses ranging from ⅛" downward.

The number of strokes per minute are 2700. Depth of stroke 28", mouth opening 6", louver cutting up to 16 ga. steel, produces folds up to 5/64", produces beads in steel up to 14 ga. The unit is equipped with ¾ hp, ac, dc motor, 110-220 volt.

Use ACTION Card, opposite page 64. Encircle No. 58

DoALL 20" MONOLIGHT

lets you inspect flatness of large surface areas or groups of parts

- Checks flatness in millionths
- 30" x 30" work area
- 20 foot-candle intensity
- Mercury light

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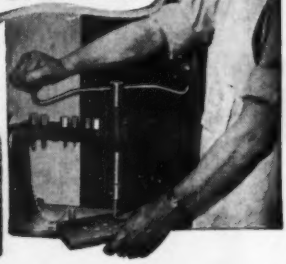

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Precision ground square and parallel to .0004/In. non-cumulative. Ground dovetailed slide. Hardened and ground jaws. Dustproof enclosed screw. Ample clamping grooves. Excellent for jib-boring, precision grinding, inspection. 10 day money-back GUARANTEE.

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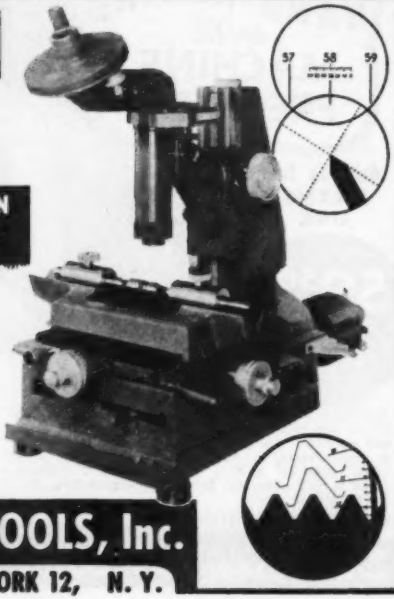
....CUTS INSPECTION TIME



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Contains Radii Templates from 21/64" to 13/16" by 1/64". Concentric circles from .010" to .280" by .010" and one blank compartment.

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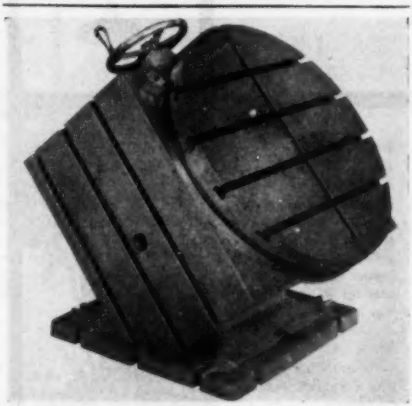

Full universal table recently developed by The Carlton Machine Tool Co., 3002 Spring Grove Ave., Cincinnati, has 32" round top, and is mounted on anti-friction bearings for easy operation. The table is claimed to make a fast, convenient setup for drilling compound angles which heretofore required a more complicated arrangement. Use ACTION Card, opposite page 64. Encircle No. 60

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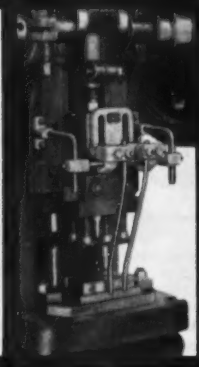
Takes round or flat wire and tubing. Rolls adjustable by means of socket set screw. For use with automatic Slide, Roll or Hitch Feeds. Units available with 5, 7, 9 or 11 grooved rolls.

MOTOR DRIVEN STOCK STRAIGHTENERS
For all thin materials. Entering rolls power driven; top rolls are individually adjustable for stock thickness. Available in eight sizes.

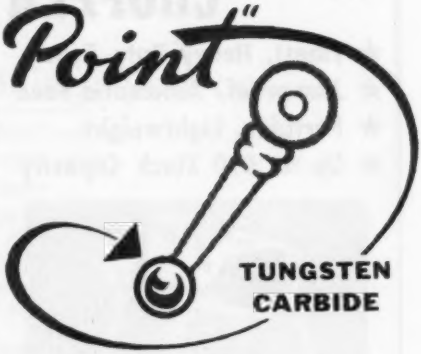
SWEEP GUARDS
A positive safety guard on power presses. Easily installed. Downward motion of ram removes operator's hands. Rugged—withstands jarring impact of press. Needle bearings in guard housings assures long life.

Write Now for new catalog showing prices and complete line of Equipment.



DURANT Tool Supply Co.
136 SOUTH WATER STREET, PROVIDENCE 3, R. I.

"The Difference is in the Point"



Westfield gage indicator points have permanently fused Tungsten Carbide balls, unequalled in hardness and durability.

Now, with this new process, gage indicator points last indefinitely without flattening.

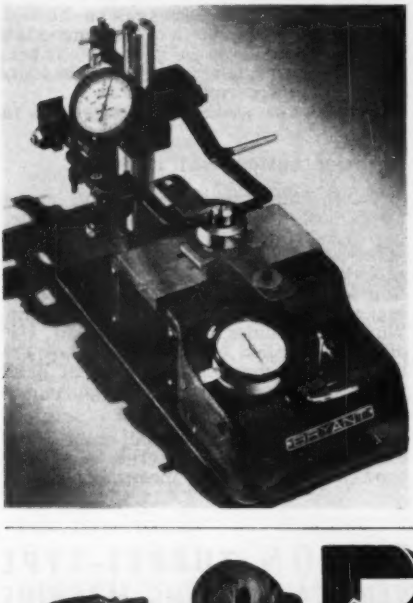
New Indicator points may be purchased complete for $4.50 each. They are made to fit Last Word, Gem, Brown & Sharpe No. 743 and Federal Testmaster in all current size balls. When ordering Federal Testmaster, specify if you want 1/10 type (short) or 1/1000 type (long). $1.00 credit can be had for worn points.

ORDER TODAY

WESTFIELD GAGE CO.
53 Church Street
WESTFIELD, MASSACHUSETTS

Squareness-of-face attachment

Bryant Chucking Grinder Co., Clinton St., Springfield, Vt., has introduced a squareness-of-face attachment for use



DoALL ADJUSTABLE THREAD RING GAGES

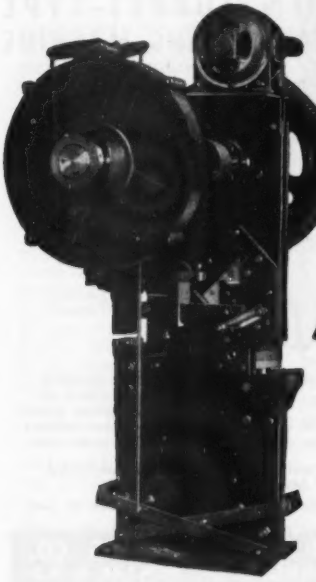
remain *perfectly* round through full range of adjustment and retain setting while in use.

2½ to 12 times longer life—over 50% less weight than conventional gages

Call DoALL — consult classified phone directory for DoALL Service Store that stocks gages, cutting tools, supplies, or *Write*

The DoALL Co.
Des Plaines, Ill. 15

Also Thread Plug Gages, Cylindrical Plug and Ring Gages, and Master Setting Discs



Beloit

COMBINATION PUNCH, BAR SHEAR, ANGLE SHEAR and NOTCHER

Here's the ideal equipment for shearing, mitering, notching and coping angles. This model also shears flat and round bars. Punches to the center of 10" without changing the set-up. Versatile. You'll find many jobs for this Beloit machine . . . and the savings will more than pay for it!

Send for illustrated literature and prices today.

Write for complete details.

HENDLEY & WHITTEMORE CO.
100 Blackhawk Blvd. Beloit, Wis.

Now... a quality

JIG BORER

that every shop can afford

The SIMA Jig Borer features an unusually large hand scraped table, providing 20" longitudinal and 15" transverse travel.

Utilizing the basic measuring system of "super accurate" end measures and .0001" dial indicators, close "tenth" tolerances can be maintained. 16 spindle speeds of 35-1500 rpm; and a "kwik-switch" spindle nose design facilitates use of standard tooling. Prompt delivery.

Write today for full details.

AMITOOL COMPANY
629 MAIN STREET
WESTBURY, L.I., N.Y. WEstbury 7-3400

with its Model 21 thread gage in checking internal and external threads.

Attachment measures squareness of face in relation to the axis of a thread. Both over and under faces can be checked. The unit is adjustable to accommodate face diameters from ¼" up to 7". It permits simultaneous readings of thread size as well as face run-out.

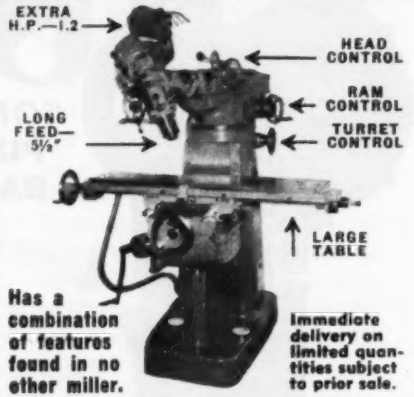
Use ACTION Card, opposite page 64. Encircle No. 118

Abrasive cutter, wet type

No. 11-TMM wet type abrasive cutter for cutting tungsten, molybdenum, etc., particularly in thin sheets, is claimed to make accurate longitudinal cuts on bars, tubes and sheets. Work head carries cutting wheel 12" dia. x 1/16" thick operating at 1720 rpm from motor of ¼ hp. Work head slides on two bars of 1¼" dia. and cranked over a distance of 42"; the travel is manual by means of hand wheel and feed screw which engages a half nut on work head.

For quick return, the half nut is disengaged from the feed screw and work head moved back by means of handle.

TRISON TURRET-TYPE VERTICAL MILLING MACHINE



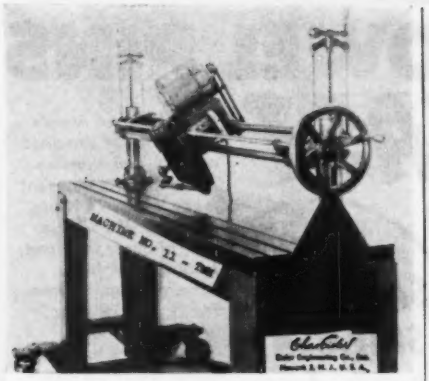
Has a combination of features found in no other miller.

Immediate delivery on limited quantities subject to prior sale.

Some territories open for established Machine tool dealers.

Write us for full particulars and name of your nearest dealer.

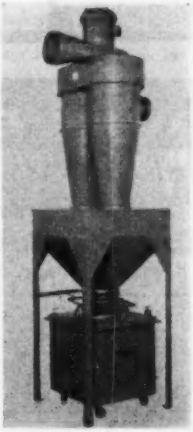
TRISON MANUFACTURING CO.
151B MULBERRY ST., NEWARK 2, N.J.
Mitchell 3-0316



The work head can be tilted and locked at any angle from vertical to horizontal. Eisler Engineering Co., Inc., Dept. MTB, Newark 3, N.J.

Use ACTION Card, opposite page 64. Encircle No. 66

Portable dust bin



Torit Mfg. Co., 303 Walnut St., St. Paul, Minn. has introduced a portable dust bin as optional equipment for its Model 219 twin cyclone dust separator. It is intended for use where large volumes of dust require frequent emptying of the dust reservoir for disposal or salvage.

Use of this bin requires that the separator be mounted on legs and equipped with a hopper bottom. From this hopper a 12" diam. flexible sleeve leads to a lid that fits onto the bin with clamps.

To change dust bins the operator loosens the four clamps, raises the lid lever and rolls out the bin. Capacity is eight cubic feet.

Use ACTION Card, opposite page 64. Encircle No. 67

New model Loadmeter announced

A new model Loadmeter (Model L-122) has been introduced by the Detroit Milling Cutter Co., Dept. BB, 28625 Grand

DoALL GAGE BLOCKS

. . . Unsurpassed Accuracy

- Another precision product manufactured by DoALL
- Rectangular type
- Grades AA, A and B
- Complete line of accessories

18 Sets 3 to 118 pieces

Blocks up to 10" long

TEXTBOOKS

Gage Block Height Tables $2.95

Science of Precision Measurement $3.50

Call DoALL

see classified phone directory for nearest DoALL Service-Store — complete stock of gages, cutting tools, supplies.

Or Write: The DoALL Co. Des Plaines, Ill.

32

*NIROL the incomparable COMPENSATING LIVE CENTER

Permits perfect support of all loads and thrusts. Reduced overhang adds rigidity and increases machine capacity. Compensating factor provides for work expansion from heat while machining.

Write for complete information.

*Registered U.S. Patent Office

NIROL MFG. CO.

900 HIGHWAY 22, N. PLAINFIELD, N. J.

When you need precision steel **DOWEL PINS** **FAST**

Get SAME-DAY SHIPMENT from

• Order from Acme's huge stock of standard nominal and oversize Dowel Pins... shipment made within 24 hours. Whether you need a few, or many thousand, packaged or bulk, Acme can supply them FAST! Special sizes ground from semi-finished stock to fill any dowel pin requirement. Send for details now!

ACME
INDUSTRIAL COMPANY
210 N. LAFLIN ST.
CHICAGO 7, ILL.

MFRS. OF STANDARDIZED DRILL JIG AND FIXTURE BUSHINGS

COOLEY HEAT TREATING FURNACES

ELECTRIC BOX TYPE • FLOOR AND BENCH MODELS
For Tools and Small Parts

SHOWN HERE

THE COOLEY FLOOR MODEL
for HARDENING AND TEMPERING

Max. Temp.	Sizes	Price
2000°	12" x 8" x 18" 12" x 8" x 24" 12" x 8" x 36" 15" x 12" x 30"	$1030 to $1485

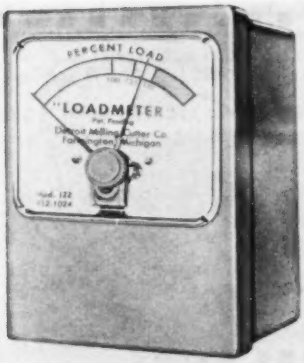
All prices are less controls. Any standard controls available for automatic temperature control.

- Cooley modern design provides natural convection—increases uniformity. Heavily insulated large area door makes for low heat loss—reduced power needs.
- Natural thermal convection.
- Easily removable heating elements.

Controlling Pyrometers carried in stock — available for all applications.

Free on request: ☐ COMPLETE CATALOG ☐ "SHOP NOTES ON HEAT TREATING"

COOLEY ELECTRIC MANUFACTURING CORP.
36 SO. SHELBY • INDIANAPOLIS, IND.



River, Farmington, Mich., which is claimed to be adaptable to practically all types of motor driven equipment.

New features include: Calibration can be performed by adjusting the calibration dial for the desired 100% amperage; the donut type transformer provides ease of installation by running a motor lead through the transformer window at the switch box, and low voltage is carried to the meter by means of the 8' leads.

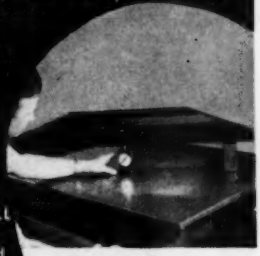
Use ACTION Card, opposite page 64. Encircle No. 68

DoALL BLACK GRANITE STRAIGHT EDGES

Made Accurate · Stay Accurate

Harder than glass
Smooth · Rigid

Not affected by temperature or humidity changes

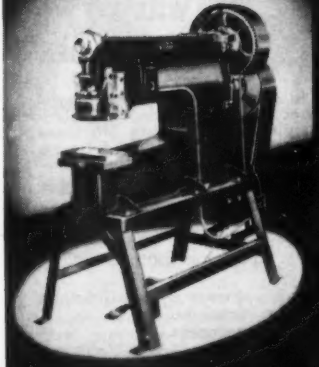


Call DoALL —see classified phone directory for nearest DoALL Service-Store. For granite surface plates, straight edges, parallels and V-blocks; gages; cutting tools, supplies — or *Write*

24" to 72" lengths

.00005" accuracy

The **DoALL** Co.
Des Plaines, Illinois 27



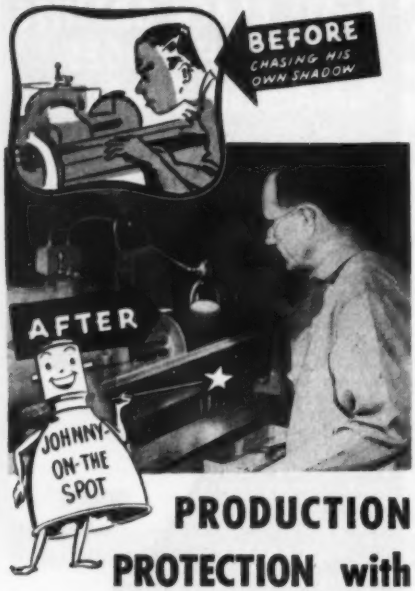
WHITNEY METAL
TOOL COMPANY
42 YEARS EXPERIENCE

WHITNEY-JENSEN
No. 230 — No. 231 DEEP THROAT
POWER PUNCH PRESSES

These sturdy, deep-throated presses are widely acclaimed for their high speed and accurate production. Frames are welded steel; auxiliary attachments available; various punches and dies in stock for these two outstanding models.

Capacity: 20 tons
Throat Depths: 18" and 24"

WHITNEY METAL TOOL COMPANY
115 FORBES STREET, ROCKFORD, ILL.



PRODUCTION PROTECTION with

VIMCO Lights

Help guarantee the operators' best efforts . . . **and** your machine's production capacity . . . by installing **Vimcolights** as original equipment. **Vimcolights** chase shadows . . . help relieve eye tensions and weariness . . . with **"on the spot"** supplementary lighting.

Write for new bulletin No. 85

Vimcolights are (UL) listed

VIMCO MFG. CO., Inc.

1919 — 35th — 1954

Anniversary

109 BRAYTON ST. BUFFALO 13, N. Y.

WHY WAIT

FOR BIG MARKING MACHINES

WHEN THESE HANDY BENCH MODELS WILL DO YOUR WORK

Carried in stock is a full line of Hand and Power driven Marking, Numbering, Stamping and Printing Machines always available for prompt delivery.

ASK FOR SERIES 9A MACHINES

Hundreds of different machines and adaptations of machines may be promptly and efficiently suited to your standard or special marking need.

Send samples, drawings or full details for the recommendations of our engineers.

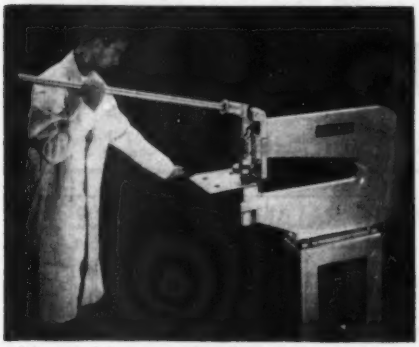
THE ACROMARK CO.

15 MORRELL ST. ELIZABETH 4, NEW JERSEY

New Niagara lever punch and shear

The No. 5-24 deep throat lever punch and shear is in production at Niagara Machine & Tool Works, 637 Northland Ave., Buffalo 11, N.Y.

Having a 5-ton capacity and 24" throat,



this machine permits shearing in straight lines or intricate shapes as well as numerous types of punching and notching. It shears from front to back or left to right and slits sheets up to 48" wide down the center.

Use ACTION Card, opposite page 64. Encircle No. 73

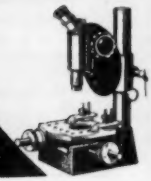
Toolmaker's Microscope

Made by Bausch & Lomb.. Sold by DoALL

for Examination and Measurement in the shop, in the lab

- Speeds work
- Reduces error
- Unreversed image
- Cannot damage delicate parts

Call DoALL — consult yellow directory for nearest DoALL Service-Store that stocks cutting tools, gages, supplies—*or Write*



The DoALL Co.

Des Plaines, Ill.

THE BETTER BUY

Baldor

★ ASK FOR BULLETIN 321-J

HEAVY DUTY

SHOP GRINDERS

fully guaranteed

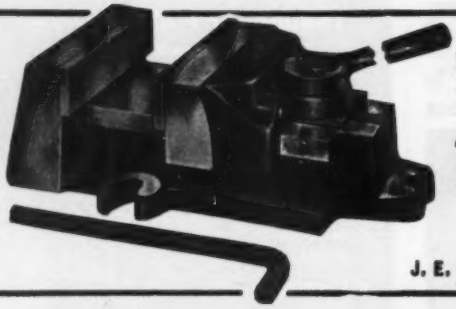
With ball-bearings that never require re-lubrication

AT RIGHT: Baldor Grinder No. 600 series. 1/3 h.p., ball-bearing, dynamically balanced motor. 1 phase, 60 cy., 3450 r.p.m. Two first-grade, individually balanced 6" wheels—1 coarse, 1 fine. Motor stands repeated overloads and WILL NOT BURN OUT. Wide clearance between wheels and motor frame for fast, precision grinding.

It's the Better Buy at $49.00

BALDOR ELECTRIC COMPANY

4368 Duncan Ave., ST. LOUIS 10, MO.



Plunket Quick Action Vise
for DRILL PRESS or MILLING MACHINE
Designed for production work, using an eccentric motion to apply pressure to jaws. Eccentric motion moves jaws 5/16".

Size No. 7	Net Price
6" jaws, 1½" deep, opens 4"	$83.16

Pressure between jaws, with handle furnished, 2200 lbs. Net weight 36 lbs.
Our complete line includes Vises for Drill Presses, Milling Machines, Shapers, Grinders

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J. E. Plunket Machine Co. 3230-32 Archer Ave. Chicago 8, Ill.

PRECISION ELECTRONIC DYNAMIC BALANCING SERVICE
For: Job-Type, Single Piece, and Short-Run Production

ANY ROTATING PART SUCH AS:
- TURBINE ROTORS
- GEARS
- PUMP IMPELLERS
- MACHINE TOOL SPINDLES
- FLYWHEELS
- CUTTER HEADS
- EXPERIMENTAL UNITS

Our equipment allows quick setup with no special tooling in most cases to allow precision balancing at reasonable prices.
Consult us about engineering your balancing and vibration problems.

ALSO:
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ELECTRONIC DYNAMIC BALANCING COMPANY
1614 N. HERMITAGE AVE. CHICAGO 22, ILLINOIS

So many standard styles . . . one must be just right for you!

For 66 years we have been producing metal-working tools and adding to our standard line. Today we have PUNCHES and DIES in a large range of round, flat, oval, and square sizes to fit most makes of punch presses immediately available from stock at regular low, standard prices.

Send for our complete catalog sheets.

T. H. LEWTHWAITE MACHINE CO.
312 East 47th St., New York 17, N. Y.

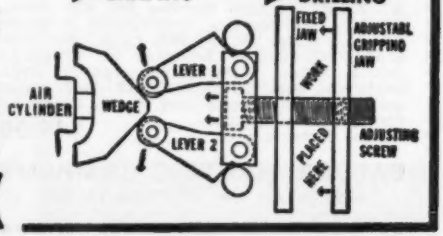
how about air vises!

AIRLOX pat'd wedge-&-lever action utilizes total cylinder drive. Positive rigid grip on the work. Especially suited to CARBIDE MILLING. Five models 50 to 200 lb. air line pressure Write for data sheet. PRODUCTION DEVICES, INC., Whitehall, N. Y

SAFE . . . POSITIVE POWERFUL

AIRLOX

✔ MILLING ✔ PLANING ✔ SHAPING ✔ TAPPING ✔ BROACHING ✔ DRILLING



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STEEL Stanho PRODUCTS

Stainless Steel TAPER PINS

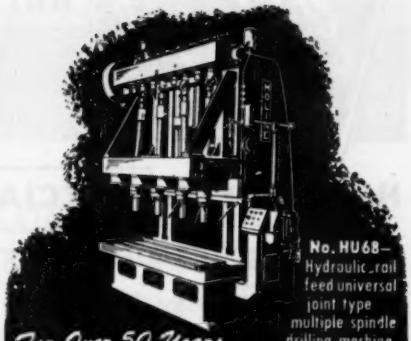
Complete stock, all sizes #7/0 through #14.
Special sizes to order.
Milled or Centerless Ground (Precision Type)
Made to accurate tolerances.

Also "Stanho" Taper Pins made from selected screw stock, Monel, Brass, Aluminum or other metals. Clean bright finish —prompt shipments.

Write for description and prices.

JM-6

STANDARD HORSE NAIL CORP
Since 1872 SEW BRIGHTON, PA.



No. HU68— Hydraulic rail feed universal joint type multiple spindle drilling machine.

For Over 50 Years

MOLINE "Hole-Hog"

Specially Designed

MACHINE TOOLS

MOLINE TOOL CO. "HOLE-HOG" MOLINE, ILLINOIS

have cut production costs for American Industry.

BENCH BIN UNITS

Tool Room Money Savers for Small Parts Storage

Model	Width	Depth	Height
B-15	32½"	7"	5¾"
R-18	35"	7½"	6½"
B-30	20 3/16"	8"	23¼"
B-54	35¼"	8"	23¼"

WRITE FOR CATALOG AND PRICE

BATHEY MFG. CO.

100 SO. MILL ST. PLYMOUTH, MICH.

FREE ASSEMBLY ENGINEERING SERVICE

ON STAKING AND RIVETING

High Speed Hammer specialized experience has found the answers to knotty assembly problems involving staking and riveting for thousands of manufacturers. We can do the same for you!
Just send us prints and/or parts to be assembled. In less than one week we'll speed back a sample assembly—properly riveted or staked, along with a complete production analysis covering tooling, set-up, procedures, costs and a firm quotation on the High Speed equipment designed to do the job. ABSOLUTELY NO COST OR OBLIGATION.

Send for illustrated literature on High Speed Staking Machines and Cold Riveters.

HIGH SPEED HAMMER CO., INC.
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Sid Tool Company

WHY WAIT FOR SPECIAL TAPS?

. . . Has them IN STOCK for IMMEDIATE DELIVERY!

HIGH SPEED SPECIAL RIGHT HAND TAPS

SIZE	THREAD
4	32-48-60-64
5	30-32-36-48-80
6	36-40-48-56-60
7	32-40
8	24-30-36-38-40-44-48
9	24-28-32-40
10	28-30-36-40-48-64
12	20-28-32-36
14	20-24-28
1/16	60-64
5/64	72
3/32	48
7/64	48-56
1/8	32-40
5/32	32-36-40
9/64	36-40
11/64	36
3/16	20-24-32
13/64	32
7/32	24-28-32
1/4	18-24-26-27-30-32-36-40
5/16	16-20-22-27-28-32-40

SIZE	THREAD
3/8	12-16-18-20-27-28-32-36-40-48
7/16	12-16-18-22-24-27-28-30-32-36-40
1/2	12-14-16-18-22-24-26-27-28-30-32-40
9/16	16-20-24-27-28-30-32-40-48
5/8	12-14-16-20-24-27-28-32-36-40
11/16	11-16-18-20-24-27-28-30-32
3/4	9-11-12-14-18-20-24-26-27-28-32
13/16	10-14-18-20-32
7/8	10-12-16-18-20-24-27-28-32
15/16	8-9-10-12 14-16-18-20-24-32
1	10-12-16-18-20-24-27-32-40
1-1/16	12-14-16-18-20-24
1-1/8	8-10-14-16-18-20-24-32
1-3/16	8-10-12-14-16-18-20-24
1-1/4	8-10-14-16-18-20-24-32
1-5/16	12-14-16-18-20-24-32
1-3/8	8-10-14-16-18-20-24
1-7/16	8-10-12-16-18-20-24
1-1/2	8-10-14-16-18-20-24-28
1-9/16	18-20-24
1-5/8	5½-8-10-12-13-16-18-20-24
1-11/16	10-12-14-16-18-20-24

SIZE	THREAD
1-3/4	8-10-12-14-16-18-20-24
1-13/16	8-10-12-14-16-18-20
1-7/8	8-10-12-14-16-18-20-24
1-15/16	8-10-12-14-16-18-20-24-28
2	4-½-8-10-12-16-18-20
2-1/16	12-14
2-1/8	12-16-20
2-3/16	12-16
2-1/4	4-½-8-12-14-16-18
2-5/16	12-18
2-3/8	12-16-18
2-1/2	8-10-12
2-9/16	18
2-5/8	12-16-20
2-3/4	16
2-7/8	8-12-16
3	8-16
3-1/4	8-12-16
3-1/2	8-12-16
3-7/8	6
4	8-12

HIGH SPEED LEFT HAND TAPS

SIZE	THREAD
0	80
1	56-64-72
2	56-64
3	56
4	32-36-40-48
5	40-44
6	32-36-40
8	32-36-40
10	24-30-32-40
12	24-28-32
1/4	20-28-32
5/16	18-20-24-28-32

SIZE	THREAD
3/8	16-24-32
7/16	14-20-28
1/2	12-13-20-28
9/16	12-18-20-24
5/8	11-12-18-20-24
11/16	11-16-24
3/4	10-16-18-20
13/16	16
7/8	9-12-14-18-20
1	8-12-14-16-18-20
1-1/8	7-12
1-1/4	7-12-16-18

SIZE	THREAD
1-3/8	6-8-10-12-16-18-20-24
1-7/16	8-10-12-14-16-18-20
1-1/2	6-8-10-12-16-18-20
1-9/16	8-10-12-16-18-20
1-5/8	8-10-12-14-16-18-20
1-11/16	8-10-12-14-16-18-20
1-3/4	8-10-12-14-16-18-20
1-13/16	8-10-12-14-16-18-20
1-7/8	8-10-12-14-16-18-20
1-15/16	8-10-12-14-16-18-20
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AVAILABLE LITERATURE

FREE CATALOGS AND BULLETINS AVAILABLE FROM MANUFACTURERS

For copies of the literature in which you have an interest use the postage-paid postcard on the next page. Merely circle the identifying numbers and mail the postcard.

1. Lead Screw Tapping Attachments. Bulletins issued by Automatic Methods, Inc., 959 W. Grand St., Elizabeth, N.J., describe company's line of lead screw tappers and lead screw tapping attachments for converting drill press setups.

2. Squirrel-Cage Motors. Four-page booklet describes S. A. Woods Machine Co., Dept. BB, 12 Damroll St., Boston, Mass., Type C & G enclosed, fan-cooled motors.

3. Punches & Dies. New 20-page catalog has been released by Ring Punch & Die Co., Dept. MB, 108 Foote Ave., Jamestown, N.Y., covering new products now available, dimensions and illustrations.

4. Press Brakes. Informative Bulletin 89-C by Niagara Machine & Tool Works, 637 Northland Ave., Buffalo 11, N.Y., covers new line of press brakes. Described and illustrated: double end twin drive, rigid frame construction, box-type crowns, sealed oil baths for gearing, laminated non-metallic ways and electro pneumatic clutch. Also specification tables for 50 to 775-ton line, fundamentals of press brake work and data for computing bending, punching and blanking tonnages.

5. Automatic Turret Lathes. Thirty-four production ideas to help increase output and reduce costs are presented in a 24-page booklet released by Potter & Johnston, Dept. BB, Pawtucket, R.I. Specifications and problems are covered as well as company's complete line of turret lathes.

6. Stainless Steel. Two steel catalog sections from Firth Sterling Inc., Dept. BB, 3113 Forbes St., Pittsburgh, Pa., give information as to typical analysis characteristics, applications, forgings, general heat treatment, annealing, hardening and tempering data. Catalogs cover CYW Choice and Type 420 Stainless steel. CYW Choice is a chromium alloy hot-work steel developed for dies and other tools subjected to heavy pressure while in contact with hot steel. Type 420 is commonly known as the cutlery type, useful for many purposes where a combination of good resistance to corrosion and wear is a factor.

7. Magnetic Sheet Steel Separators. A new bulletin from Bass & Co., Inc., represented by E. V. Nielsen Inc., Dept. MB, 129 Broad St., Stamford, Conn., covers small magnetic sheet steel separators in series "50". These separators are for manufacturers using light metals, such as tin lithographers, light transformer manufacturers, canning industry, typewriter can manufacturers, etc. Specifications include three sizes: 1", 3½", and 4½" stacks of sheet metal.

8. Hardness Tester. New illustrated two-page brochure, F-1689-2, released by Barber-Colman Co., 7412 Rock St., Rockford, Ill., presents data on Barcol Impressor, a portable hardness tester for aluminum, aluminum alloys, copper, brass, and other materials including plastics. Instrument is lightly pressed against material and reading is instantly indicated on dial.

9. Size-Optional Drills. A new circular, issued by Mohawk Tools, Inc., Dept. MBB, 910 E. Main St., Montpelier, Ohio, describes semi-standard drills. The Size-Optional is a new concept in Sublands in that nearly completed blanks are kept in stock, thus increasing delivery speed.

10. Polishers and Power Drills. Jones Motrola Corp., Dept. BB, 432 Fairfield Ave., Stamford, Conn., has released three brochures covering lines of floor polishers, ball bearing polishers, drill press stand for portable electric drills and portable drills.

11. Mounted Wheels & Mounted Points. Full color codes of Jarvex mounted wheels and mounted points are contained in 12-page catalog from Charles L. Jarvis Co., Dept. MB, Middletown, Conn. Color code for wheels and points includes steel, steel castings, ductile iron, cast iron, carbides, glass and non-metallic grades.

12. Power Bit & Extension. Two new tools for plumbers, electricians, service mechanics and maintenance men are being marketed by Stanley Tools, Dept. BB, New Britain, Conn. Bulletin No. 184 gives illustrations and specifications of No. 104 power bit and No. 104 extension. Power bit is heat-treated entire length, and features hand-sharpened lip and spur. Fits 3-jaw electric drill chuck $\frac{3}{8}$" and larger. Extension follows 11/16" and larger bits, fits $\frac{3}{8}$" and larger drill chucks. Two lengths—18" and 24".

13. Duplicator. For duplicating on engine lathes, D. C. Caulfield Copy-Master, Dept. MB, Manchester, Conn., has released four-page catalog, giving illustrations of operations in which duplicator is applied.

14. Sheet Steel Separator illustrations are contained in Bulletin from ABA Tool & Die Co., Inc., Dept. MB, 1395 Tolland Turnpike, Manchester, Conn. Nutmeg sheet steel separator is a permanent magnetic, self-contained device which requires no electrical or air connection. It works on principle of inducing a magnetic field in the stacked steel sheets, causing them to separate.

15. Universal Joints. New catalog from Curtis Universal Joint Co., 16 Birnie Ave., Springfield 7, Mass., contains a large "exploded" view of typical joint showing individual parts keyed by numbers; assembly and disassembly instructions are accompanied by detailed illustrations. Graph shows test curves from tests on production joints which support catalog ratings of Curtis Joints. Complete engineering and purchasing data are grouped in a chart.

16. Cutter Grinder. Brochure covering newly patented Weydemann & Hasselkus universal tool grinding machine available from Marac Machinery Corp., Dept. MB, 45 S. Broadway, Yonkers, N.Y. This cutter grinder is for grinding milling cutter clearances by direct angular setting. Spindle swings about center of cutter and leaves a stronger tooth because clearance is not hollow. Diagrams and specifications are included.

17. Pull-Down Broaching Machines. Specification data on nine different machine models, including an entirely new 50-ton, 72" stroke machine, is covered in 4-page bulletin, RD-54, from Colonial Broach Co., Dept. BB, Box 37, Harper Station, Detroit 13, Michigan. Dimensions of models are presented in table form with an accompanying keyed line drawing. Close-up photos show electronic and hydraulic control panel arrangements.

18. New Chipless Machining Process for cold-forming splines, serrations and similar forms is presented in 4-page, illustrated Buletin RF-54, from Michigan Tool Co., Dept. MB, 7171 E. McNichols Rd., Detroit, Mich. Known as the "Roto-Flo" process, the bulletin treats it in step-by-step fashion so introduction of this new metalworking technique will be easily understood. Covered are tooling, parts formed, automation of cold-forming machines, a typical application, and several design advantages possible through "Roto-Flo" cold-forming.

19. Fire Hazards & Safeguards. A 57-page survey on fire hazards and safeguards for metalworking industries is available from National Board of Fire Underwriters, Dept. MMB, 85 John Street, New York 38, N.Y. Survey points out many new factors have entered fire safety picture. New uses of woodwork and plastic materials in fabrication processes, as well as the use of flammable liquids have created fire causes in a more pronounced form.

20. "Practical-Engineered Conveyor Units & Systems." This new brochure from W. F. & John Barnes Co., Dept. MMB, 369 S. Water St., Rockford, Ill., describes solution of 27 material handling problems. Also featured are conveyors for metalworking, food, drug, chemical processing, wood products, ordnance, electrical manufacturing and other similar industries.

21. "Quick Facts About Chain." New bulletin issued by Joseph T. Ryerson & Son, Inc., Dept. BB, PO Box 8000-A, Chicago 80, Ill., has data on chain for load binding and tie-down, agricultural implements, towing, tail-gates, logging, railroad use, etc. Also specifications and working load limits for alloy steel chain manufactured for lifting purposes.

22. Pressure Blast Wet Blasting application for the detection of cracks and flaws in carbide tooling and the honing of carbide and high speed steels is described in bulletin by Earl V. Anderson, tool engineer, Allison Div., General Motors Corp., and Prof. James Bennett, Hillyer College. This publication is available from Cro-Plate Co., Inc., Dept. MB, 747 Windsor St., Hartford, Conn.

23. "Machining For Profit" is the theme featured in new 12-page lathe catalog issued by Rivett Lathe & Grinder, Inc., Dept. MTBD, 18 Riverview Rd., Boston, Mass. Catalog illustrates and describes the Rivett 918 "Steelway" precision cabinet lathe. It also describes two new types of drives available: a production drive permitting one operator motion for multiple function; and a variable drive for instant selection of any speed.

24. Diamond Grinding Wheels & Hones. Catalog No. 1233, containing an assortment of standard sizes of grinding wheels and hones, is available from Norton Co., 20 New Bond St., Worcester 6, Mass. Included in tables of 52-page booklet is net price of items listed in various ordering quantities. Information on diamond wheel markings, selection of wheels, standard shapes of wheels, and suggestions on use of diamond wheels and hones is included.

25. Milling Cutters. Forty-four page catalog from Viking Tool Co., Dept. BB, Shelton, Conn., covers line of replacement screws and wedge locks, end mills, face mills, standard taper shank arbors, straight and offset turning tools, face and duplicating tools. Specifications, illustrations and diagrams are covered in two-color catalog.

26. "Why the Small Fork Truck?" written by Nathaniel Warshaw, of Market Forge Co., Dept. BB, Materials Handling Div., Everett 49, Mass., is a 28-page booklet which shows how small and medium sized plants can compete with big business in materials handling efficiency. Booklet may also serve as text for teachers and students in regard to design and function of small power trucks.

27. New Hot Extruded Shapes. Allegheny Ludlum Steel Corp., MTB, 2020 Oliver Bldg., Pittsburgh 22, Pa., has available leaflet describing new hot extruded shapes offered in stainless, tool steels, high temperature alloys and other steels. It also describes advantages in purchasing extruded shapes that can be closer to finish sizes than for regular hot rolled materials, reduced scrap losses, advantages in small quantity production, and physical characteristics of extruded shapes. Illustrations of shapes already produced are included.

28. Live Pilot Bearing Bushings cost cutting applications are described in a new 8-page catalog from J. G. Jergens Div. of Donley Products, Inc., Dept. MTB, 1106 Avon Ave., Cleveland 5, Ohio. Application photos, engineering data, cost saving ideas, questions and answers on uses and performance features of Jergens live pilot bearing bushings are included. Precision piloting applications of live bushings on boring mills, radial drill presses and milling machines are illustrated.

29. Glassworking Lathe Chucks. New Folder WGL-100 illustrates and describes Westcott Chuck Co., Dept. BBM, Oneida, N.Y., line of special handwheel actuated glassworking lathe chucks.

30. Molded Plastics In Small Lots examples are given in an 8-page booklet from Dayton Rogers Manufacturing Co., Dept. B, Minneapolis 7, Minn. Illustrated typical examples of parts produced from short-run molds are shown. Cost data, materials available, and some facts regarding short-run molding facilities are supplied.

31. New Hydraulic Control Valves. Logansport Machine Co., 803 Center Ave., Logansport, Ind., has issued catalog sheets covering eight new hydraulic control valves with ball detent for position locking. Included are six 3-position, 4-way valves and two 2-position 4 and 3-way valves. Complete line is covered in Catalog No. 200, Section 4.

32. Thread Comparator. Illustrated 4-page folder from Pratt & Whitney, 22 Charter Oak Blvd., West Hartford 1, Conn., gives specifications, diagrams and adaptations of thread comparators.

33. Lubricant. Complete line of Gredag Inc., Dept. MB, Niagara Falls, N.Y., industrial lubricants covered in four-page folder. Data covering service recommendations is supplied.

THIS HELPFUL LITERATURE NOW AVAILABLE

34. Twist Drill Catalog & Technical Manual are available from New York Twist Drill Co., Dept. BM, 174 Lafayette St., New York 18, N.Y. Catalog contains technical information, prices and engineering service. Technical manual includes: diagrams; drilling speeds for stainless steel, cast iron, manganese steel, aluminum, magnesium, bronze, and plastics; and table decimal equivalents.

35. High-Speed Surface Broaching. A new development in the field of high-speed surface broaching is featured in a 4-page Bulletin HM-54 available from Colonial Broach Co., Dept. MB, PO Box 37, Harper Station, Detroit, Mich. It illustrates and describes new line of mechanical horizontal broaching machines. A speed and capacity chart shows the potential of machines for high production work.

36. Lathe Attachments. Catalog No. 5418 from South Bend Lathe Works, 425 E. Madison St., South Bend, Ind., covers complete line of attachments and accessories. Included are lathe, drill press, shaper and pedestal grinder accessories. Catalog is illustrated and contains 40 pages.

37. Grinding Wheels. New catalog issued by Norton Co., 20 New Bond St., Worcester 6, Mass., contains 28 pages, covering grinding wheel selection in detail. Points covered include abrasive type, bonding materials, wheel speeds, wheel markings, standard wheel shapes, mounted points, and abrasive polishing grain. Wheel applications for many common applications given in tables.

38. Fluid Power Cylinders featuring large capacity to size ratio and pronounced to deliver improved performance have been introduced by Hanna Engineering Works, Dept. MMB, 1765 Elston Ave., Chicago 22, Ill. New catalog illustrates the new 750 Fluid Power Cylinders, and shows standard mounting styles.

39. Milled Screws & Studs. Full color, 64-page catalog issued by Wm. H. Ottemiller Co., Dept. MB, York, Pa., gives specifications, illustrations and list prices of company's complete line of ready-for-shipment stock.

40. How Flange Surface Finishes Affect Gasket Sealability and Joint Performance" is the latest of illustrated technical bulletins issued by Johns-Mansville, Dept. MB, 22 E. 40th St., New York 16, N.Y. Bulletin discusses effect of flange surface finishes upon the performance of the gasket.

41. Trace-O-Matic Bulletin describes attachment that may be applied to Axelson heavy duty lathes for duplicating turned parts from inexpensive flat templates. Information includes setup, how to make plates, and two pages of case histories. Available from Axelson Manufacturing Co. Div., Pressed Steel Car Co., Dept. MB, 6160 Boyle Ave., Los Angeles 58, Calif.

42. Air Powered Vises. A new 4-page brochure from Van Products Co., 3765 West 12th St., Erie, Pa., discusses many time-saving applications of these units in production holding and pressing jobs.

43. Sub-Plate Hydraulic Valve. New line of sub-plate mounted solenoid operated hydraulic valves is described in Catalog No. 260 issued by Rivett Lathe & Grinder, Inc., Dept. MTBD, Brighton 35, Mass. Featured are J.I.C. diagrams showing flow operations under all types of action for the 14 piston designs in which new valve is offered.

44. Multi-Rip Saw. Information and description of new Model No. 99 Multi-Rip Saw available in bulletin from G. M. Diehl Machine Works, Inc., Dept. B, Wabash, Ind. Bulletin states this saw offers woodworking industry gang-rip mass production with single rip precision.

45. Right Angle Gear Drives. ANGLgear standardized right angle bevel gear units for aircraft and for industry are illustrated and described in new catalog from Airborne Accessories Corp., Dept. BM, 1414 Chestnut Ave., Hillside, N.J. Featured are drawings showing how Coniflex bevel gears utilize principle of localized bearings to provide quieter and cooler operation. Specifications given for one-third horsepower and one horsepower units.

46. Drilling Machines. New 12-page catalog from Bryant Machinery & Engineering Co., Dept. MMB, 640 Washington

SENT FREE UPON RETURN OF POSTAL CARD

Blvd., Chicago 6, Ill., covers features of Cleereman round column drilling machine and Cleereman box column drilling machine. Also gives information in illustrations and data on design, construction, and operating facility and control.

47. Power Transmission Belt. Poly-V drive is described in colorful new brochure No. 6638 issued by Raybestos-Manhattan, Inc., Rubber Division, 61 Willet St., Passaic, N.J. Design characteristics of the single, endless belt with molded lengthwise ribs, are explained in two-color line-drawings that show 14 advantages claimed for the drive.

48. Vacuum Metallizing—the depositing of a thin coating of metal by evaporation and condensation under high vacuum conditions, is a clean, low-cost production technique rapidly supplanting other metal-finishing processes on a variety of products. Without buffing or polishing, it gives a bright, lustrous, metallic finish on any base material such as plastic, metal, glass, paper or textiles. Process is described and its applications illustrated in a new brochure issued by F. J. Stokes Machine Co., Dept. MBM, Philadelphia, Pa.

49. Rotary Table. New Model No. 2 Moore 11-inch rotary table, which is accurate to +6 seconds, is described and illustrated in an 8-page, 4-color booklet from Moore Special Tool Co. Inc., Dept. BMB, 740 Union Ave., Bridgeport 7, Conn. Complete specifications, a typical calibration chart and full-color photos included. Available on letterhead request basis.

50. Stainless Steel Castings. The Alloy Casting Institute, technical association of high alloy foundries, has published a set of data sheets covering properties of all the more popular grades of alloys used for corrosion resistant castings. Consisting of 13 individual data sheets describing each of the cast corrosion resistant alloy grades, the complete set bound in a file folder is available from Alloy Casting Institute, Dept. MB, 32 Third Ave., Mineola, N.Y.

51. Gear Lapping Problems and solutions are offered in a 8-page bulletin by Michigan Tool Co., Dept. BBM, 7171 E. McNichols Rd., Detroit 12, Mich. Also presents a concise explanation of lapping process. Two external and two internal gear lapping machines are illustrated and their features, specifications and capacities are described.

52. Heavy Duty Upright Drills. Catalog No. 5415 covering new 18-speed Western

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READERS' SERVICE DIVISION

WHEATON, ILLINOIS

heavy duty upright drills available from Western Machine Tool Works, Dept. 27, 1620 E. Pleasant St., Springfield, Ohio. Drills come in three capacities, 1¼", 1½" and 1¾" diameter drill in cast iron, and in 1, 2 or 3 spindle sizes.

53. Gas & Air Valves. Folder describes gas and air valve line of Torit Manufacturing Co., 303-A Walnut St., St. Paul 2, Minn. Included are styles for exact control of compressed air, and for city, natural, acetylene and liquified petroleum gas.

54. Air Presses. Four pieces of literature covering air operated punch press, air presses, valves and air controls and kick press air conversion unit, are available from Pneumatic Products, Inc., Dept. B, Hamden 18, Conn. Folders are illustrated and include diagrams.

55. Hydraulic Pneumatic Drill. Four-page folder from Alkon Products Corp., Dept. MTB, 200 Central Ave., Hawthorne, N.J., describes hydraulic pneumatic drill capable of performing all methods of operation, including straight and step operations. Illustrations and diagrams are included.

56. Gage Indicator Points. Folder from Westfield Gage Co., Dept. MB, 53 Church St., Westfield, Mass., describes gage indicator points with permanently fused tungsten carbide points. Points will fit: Last Word, Gem, Brown & Sharpe No. 743, and Federal Testmasters, 1/10 type short and 1/1000 type long.

57. Surface Plate Specifications. An interesting formula for surface plate accuracy is contained in a new folder from Rahn Granite Surface Plate Co., Deptff MB, 639 N. Western Ave., Dayton 7, Ohio. Answer to surface plate accuracy is explained through diagrams for quick study. Information also helps determine the amount of accuracy needed for type of work handled.

58. New Gage Selector available from the Threadwell Tap & Die Co., Dept. BB, Greenfield, Mass., can be used for both ring and plug gages in fractional or numbered sizes. Selector gives threads per inch for NC or NF, thread pitch diameter and minor diameter, go and not go, for American National Classes 2 and 3 and Unified classes 1A, 2A, and 3A.

59. Electronic Machining and Grinding complete fact file explains this new process in eight individual bulletins. They include full information on how it works, cost analysis of machining jobs, how electrodes are made, how to convert from diamonds to electronic finishing and case histories.

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Guarantee Perfect Alignment

Two double rows of ball bearings in the large and small ends of this Bull Nose Center mean perfect alignment on any type of work.

Two shank sizes provide diameters from ½" to 7½" for a variety of work with a single center. Write for catalog.

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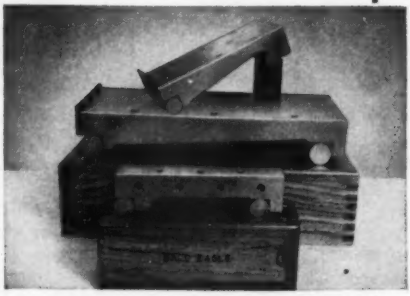
These precision sine tools are accurate to ± .0002" in center distance and parallelism. Convenient tapped holes and sturdy, end plates make set-ups easy.



*FREE—Handy table of constants for 5" sine bar or plate for your tool box. WRITE TODAY! Order from your dealer or direct. Dealer inquiries invited.

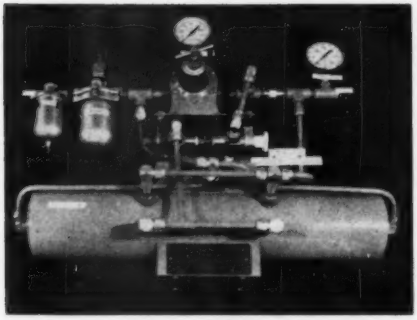
Bald Eagle Tool Company

357 MINNESOTA STREET **ST. PAUL 1, MINN.**

Booster pump ups input pressures two to one

The Dayton Rogers Mfg. Co., 2830 13th Ave., So., Minneapolis, Minn., has recently developed a pneumatic booster pump capable of boosting input pressures as much as two to one, it is claimed.

Working on the differential area principle, it is an automatic operating self-contained unit which requires no external power other than the air to be compressed.



The pump can be regulated to supply air at any pressure between its input pressure and two times this pressure. Any unit to which the pump is supplying air can be regulated at less than input pressure by shifting a knob-operated cutout valve.

Use ACTION Card, opposite page 64. Encircle No. 25

10,800 r.p.m. tool grinder provides high-speed carbide removal

A high-velocity, single-point carbide tool grinder called the HI-V operates at 10,800 rpm to combine customary rough and finish grinds into one high-speed operation. The result is said to be an increased cu. in. rate of carbide removal. Use of the ultra high speed with a nickel bond diamond wheel and a special fluid to limit energy absorption in the wheel applies to the carbide tool face approximately 95% of the total energy developed. This is accomplished without raising the internal energy of the natrix which can often lead to cracks and tool failure.

Developed jointly by Ohio Metal Working Products, Dept. B, Cleveland, O., and the Metalloid Corporation, Dept. MT, Huntington, Ind., the machine is said to be the first to utilize high velocities for practical production tool grinding. The grinder was made practical with the ad-

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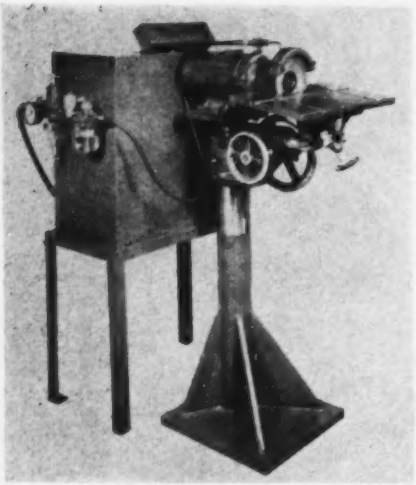
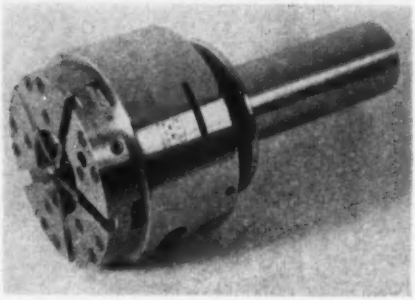


vent of the all-metallic grinding wheel to which the diamonds are bonded by pure nickel electrolytically deposited. This eliminates the hazard of wheel breakage due to the high velocities while affording a diamond bond that resists the high temperatures. The motor spindle provides two speeds of rotation with both right and left hand use. High speed operation at 10,800 rpm and a low speed of 3,600 rpm are accomplished by means of a frequency converter. The low speed is provided for forming tool radii which would be difficult at the high operating velocity due to the rapid rate of stock removal.

Use ACTION Card, opposite page 64. Encircle No. 26

Insert chaser die head

The Size 152 Style MM die head has



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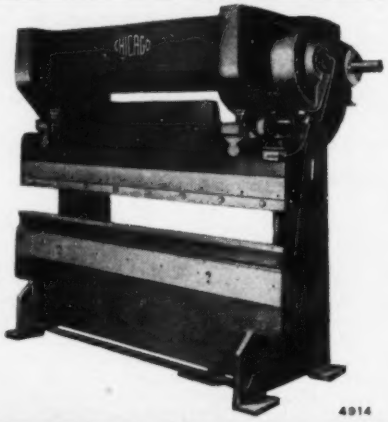


4914

DREIS & KRUMP MANUFACTURING COMPANY

7440 S. Loomis Boulevard, Chicago 36, Illinois

CHICAGO STEEL BENDING BRAKES BOX and PAN BRAKES PRESS BRAKES

been added to the rotary line of H&G insert chaser automatic die heads. It has five chasers and carriers per set; a capacity of ¼" to 1¼" dia.

The manufacturer has developed this unit for use on special classes or work such as threading over keyways or slabbed off sections.

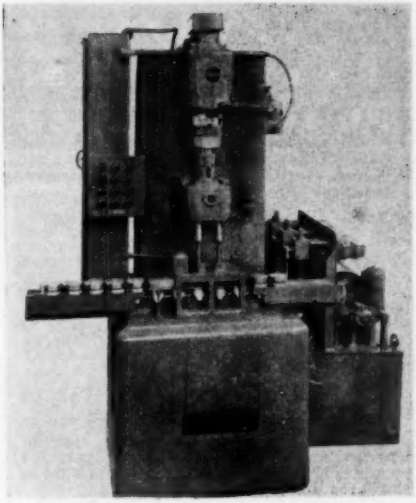
With chasers at 72 degrees instead of 90 degrees, no chaser is directly opposite another, so that roundness of the thread is claimed even if conditions are unfavorable. The Eastern Machine Screw Corp., 5 Barclay St., New Haven, Conn.

Use ACTION Card, opposite page 64. Encircle No. 27

Piston milling machine

A 3-station transfer-type piston milling machine, designed to spot mill two center bosses at once, flush with the top finish surface of the piston, will produce 1400 work pieces per hour, it is claimed.

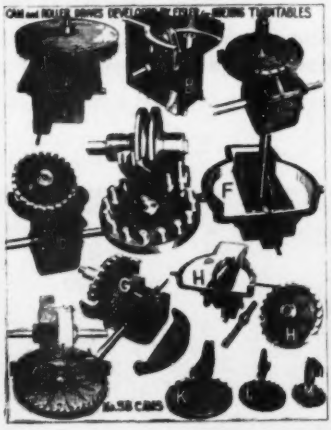
The front view shows the 2-spindle milling head, fixture and feed track. By means of a hydraulic transfer mechanism, the pistons are taken from the automation system at left and transferred two at a time into position under the milling spindles. The pistons are automatically clamped and, through limit switches, the



milling spindles go through their cycle. When the operation has been completed, the parts are unclamped and ejected from the right hand side of the machine. Each

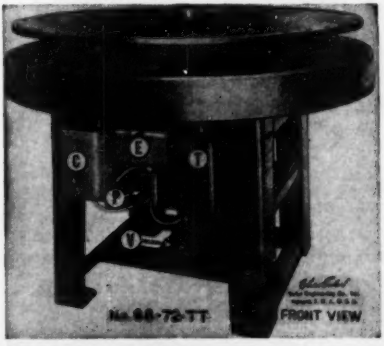
INDEXING TURNTABLES AND POSITIONERS

Eisler makes over 100 different types for welding, brazing, soldering, spraying, glass insulators, melting and glass glazing with rotating stations and motorized or hand operated. Rotating tables of all kinds for over 33 years. We supply any part or complete equipment and we make special turntables to your order and cams made to order.



CAMS

A SPECIALIZED CAM MILLING SERVICE, SPOT AND BUTT WELDER



DR. CHAS. EISLER M.E., PRES.

EISLER ENGINEERING CO., INC., 762 So. 13th Street, Newark, N. J.

TROYKE
ROTARY TABLES

- **Saves fixtures and time consuming setups.**
- **Saves time in circular positioning.**

CAM LOCKING TYPE ROTARY TABLES

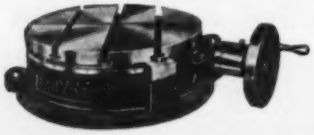
Three sizes: 12", 15", 18".

This model is intended for die sinking, bench work, and assembly of machine units when quick rotation and positioning are required.

STANDARD MODELS WORM WHEEL OPERATED ROTARY TABLES

Five sizes: 9", 12", 15", 21".

For die sinking, jig boring, cam milling. Indispensable in wood and metal pattern shops.



HEAVY DUTY MODELS WORM WHEEL OPERATED ROTARY TABLES

Three sizes: 18", 21", 25".

These larger, heavy duty models are used for jig work, planer jobs, and on horizontal boring mills.

DIVIDING ATTACHMENTS or DRILLING ATTACHMENTS can be furnished

SEE YOUR DEALER OR WRITE TO US FOR COMPLETE CATALOGS

TROYKE MFG. CO.

CINCINNATI 9, OHIO

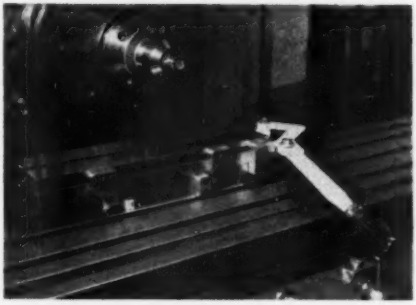
step of the operation is done automatically. Turner Bros., Inc., Dept. BTM, 2625 Hilton Rd., Ferndale, Mich.

Use ACTION Card, opposite page 64. Encircle No. 28

Auxiliary milling table

An auxiliary milling table (Micro) which is said to convert a screw milling machine to a hand feed production job in minutes has been announced by Viking Industries, Dept. B, Rockford, Ill.

Claims made for the table are: (1) in-

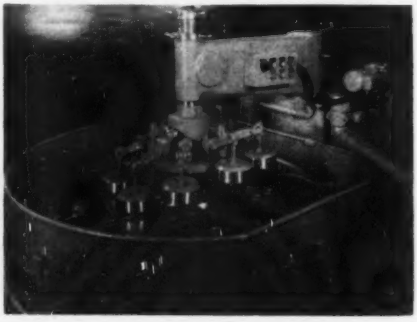


creases use of large mills; (2) steps up production on small milling; (3) useful for production drilling; (4) saves setup time. Table can be removed and replaced on mill without disturbing setup. Size of table is 4" x 14".

Use ACTION Card, opposite page 64. Encircle No. 29

Lapping machine with semi-automatic feed

A new single face, flat lapping machine known as the No. 36-F Hyprolap, with semi-automatic feed, has been announced by Norton Co., 20 New Bond St., Wor-



cester 6, Mass.

More pieces per hour are claimed to result from the provisions for continual lapping and the complete lapping of the work in a single pass around the lap. Grit is washed away by the stream of filtered coolant on the lap. Parts may be lapped to provide seal and wear surfaces, or surfaces to be subsequently drilled or milled, without the necessity of stopping the operation to clean the laps.

Lapping is interrupted only to true the bonded abrasive lap. Truing is done by a diamond held in a variable speed, power operated truing arm. An opening is provided in the work holder design to permit truing the lap without removal of the work holder.

A work pressure arrangement automatically applies the proper weight to the parts grouped in each work holder to secure the desired lapping action. This arrangement lifts the weights clear as they pass through the loading station to permit loading and unloading. The weights are then applied to the newly loaded pieces as they are moved out of the loading area.

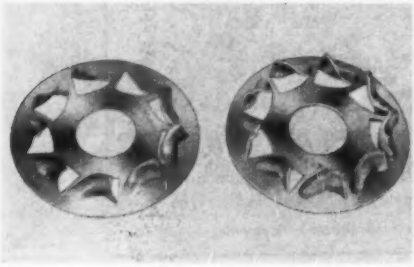
The machine can be arranged for fully automatic continuous feed operation by the addition of suitable loading and unloading devices.

Use ACTION Card, opposite page 64. Encircle No. 30

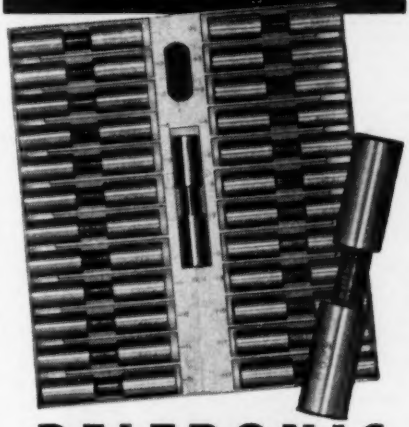
Surface grinder attachment affords damp, refrigerate grinding

A new attachment for the surface grinder is claimed to give most of the benefits of wet grinding without the mess.

An adjustable sight feed with connected tubing places approximately a drop of coolant a second into a louvred disc fitted against the back of the wheel, which gathers air, compresses it and forces the moisture through the wheel, coming out at the periphery and point



CLOSER PRODUCTION TOLERANCES!



DELTRONIC
Tenth Plug Gauges

save time and material, too!

This new system of precision gauging in sets of 25 provides one gauge of nominal size plus 12 gauges of increasingly larger sizes in .0001" increments and 12 gauges of decreasingly smaller sizes in increments of .0001".

- ★ Size variation by ten thousandths
- ★ Available in increments of 1/64" from 1/8" to 1"
- ★ Set of 25 costs approximately same as Go and No Go gauge
- ★ Hardness is Rockwell C62/C64

For further information write Dept. D.

DELTRONIC CORPORATION
9010 BELLANCA AVENUE
LOS ANGELES 45, CALIF.

of contact in a fine, quickly evaporating cold mist.

Another disc with air foils on the front of the wheel creates a suction through the pores of the wheel, helping further to distribute the moisture.

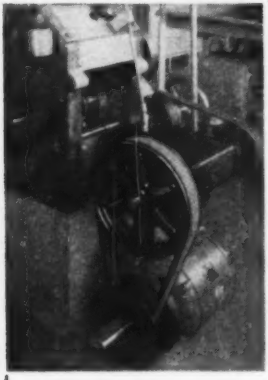
The compression and expansion developed through the wheel create a refrigeration, helpful in keeping the workpiece cool, preventing warpage. Magic City Machine Tool Co., Dept. BB, 2128 S. Walnut St., Muncie, Ind.

Use ACTION Card, opposite page 64. Encircle No. 31

Surface grinders for small parts

The Thompson Grinder Co., Dept. BB, Springfield, Ohio, announces two Type F surface grinders suitable for toolroom or production of small parts.

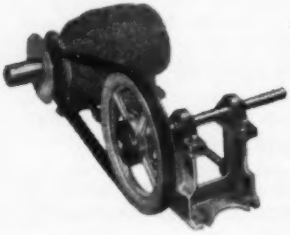
Features include: cross feeding wheel head—grinding with periphery of the wheel; rapid positioning of work; in-position wheel truing; simplified controls; small increments of down feed with wide increments of cross feed at 70 fpm table speed; two-speed 1800/36000 rpm 1½ hp motor with safety interlock to permit



increase machine performance with

LOVEJOY

Variable Speed PULLEYS



Quickly, easily installed on old or new machines . . . allowing infinitely variable speed adjustments over wide range. A mere turn of hand instantly, accurately, speeds up or slows down the driven unit for changes in production schedules . . . adjustment for operator ability . . . corrections for size or density of stock, temperature or humidity.

Available in 8 sizes—fractional to 10 hp. with ratios to 3 to 1.

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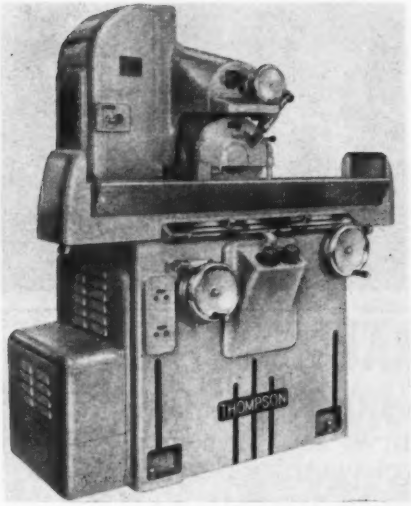
Also Mfrs. of Universal Joints and Flexible Couplings



use of either 12" or 7" diameter grinding wheels; available in 6" x 10" x 8" or 8" x 10" x 24".

Use ACTION Card, opposite page 64. Encircle No. 32

Cam-locking rotary table

The improved Troyke cam-locking rotary table, for use in assembly and subassemblies of small and medium size parts, can be locked in any position by quick action cams.

The table is hand scraped on two bearing surfaces to fit the cast iron base. Center bearing is adjustable to take up any wear that may occur. Periphery of table can be graduated in degrees for angular movement. Troyke Mfg. Co., Dept. BBB, 4422 Appleton St., Cincinnati 9, Ohio.

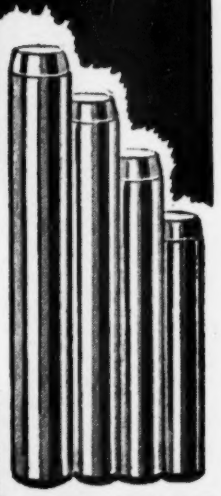
Use ACTION Card, opposite page 64. Encircle No. 33

DOWEL PINS

Immediate Delivery!

Standard Size Dowel Pins from ⅛" to 1" diameter and from ⅜" to 6" length supplied in .0002" and .001" over basic sizes. Unless otherwise specified, .0002 oversize will be furnished.

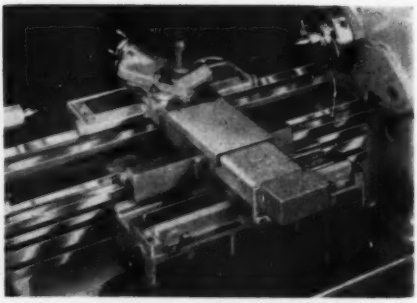
Dealer inquiries invited.



SCHULTZ & ANDERSON CO

111 EDISON PLACE, NEWARK 5, N. J.

Preloaded ball bearings featured in lathe taper attachment



An improved lathe taper attachment being marketed by Pratt & Whitney, division Niles-Bement-Pond Co., 22 Charter Oak Blvd., West Hartford 1, Conn., for use on their Model C toolroom lathes permits taper cuts of 20° included angle (4" taper per ft.), and 15" in length on the 12" lathe or 18" in length on the 16" lathe.

Preloaded balls riding on hardened and ground bearing surfaces eliminate longitudinal play, while two of the four bear-

HOW TO MAKE PROFITS FROM SMALL HOLE DRILLING!

CLEVELAND-MUNDING BENCH RADIAL DRILL combines the CONVENIENCE and ACCURACY of a sensitive drill and the RANGE and CAPACITY of a large drill with the SPEED and FLEXIBILITY of a radial drill. The Bench Radial is equipped with a 3-3/8" dia. column, has a 24" arm. Capacity in Tool Steel—1/2". Vertical travel of arm on column of 25" and horizontal travel of head on arm of 18". Spindle travel of 6-1/8" and #2 M.T. in spindle. The spindle has 8 speeds from 160 to 3140 R.P.M. and is equipped with a 1/3, 1/2 or 3/4 HP Motor.

CLEVELAND-MUNDING BENCH RADIAL DRILL

Write today for Folder No. BB-114

CLEVELAND tapping machine co.

A Subsidiary of AUTOMATIC STEEL PRODUCTS, INC. • CANTON 6, OHIO

ings in the taper bar shoe are mounted on eccentric studs, thus allowing adjustment and preventing transverse play, the manufacturer claims. The taper bar itself is bolted to the lathe bed by means of four T bolts providing greater rigidity than previously.

A straight cut can be interspaced between taper cuts without changing the taper bar setting. The attachment is protected with wipers and guards to prevent the entrance of dirt into the mechanism.

Use ACTION Card, opposite page 64. Encircle No. 34

Grinding wheel for speeds up to 6500 s.f.p.m.

Norton Co., 20 New Bond St., Worcester 6, Mass., has announced a vitrified grinding wheel for foundry use at speeds up to 6500 surface feet per minute.

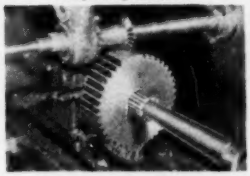
Known as the K Bond snagging wheel, it was designed for Crystolon silicon carbide wheels in rough grinding cast iron.

Advantages claimed for the grinding wheel are that less dressing is required to keep it sharp, the corners hold up longer without rounding.

Use ACTION Card, opposite page 64. Encircle No. 35

This faster—simpler expanding mandrel speeds production on all types of operation. Sleeve provides maximum bearing surface for positive holding of work without distortion or marring.

Typical precision operations using "K-O" Expanding Mandrels



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one man one bender with HYDRAULIC ATTACHMENT

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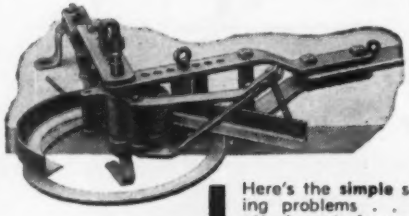

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LESS FATIGUE means MORE PRODUCTION

when you use

with their SMALL-AS-A-PENCIL HANDPIECES FOR THOSE "small-work" jobs of GRINDING, FINISHING, DEBURRING, etc.

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WHY BURDEN YOUR WORKERS with expensive, bulky awkward-to-use machines on jobs which they were never intended for? By the same token why resort to similarly awkward-to-use self-contained machines in which motor is dwarfed to fit the hand and can't "stand the gaff" and in which high-speed drops precipitately under load.

FOREDOMS ARE CHEAPER in the long run because less costly to maintain. Small handpiece size keeps the work always well in view for SUPERIOR WORKMANSHIP—GREATER PRODUCTION. Flexible shaft is light and smooth-running with extra good flexing qualities, providing effortless maneuverability.

Bench or Hang up Models for Heavy or light duty.

$25.50 Complete as illustrated

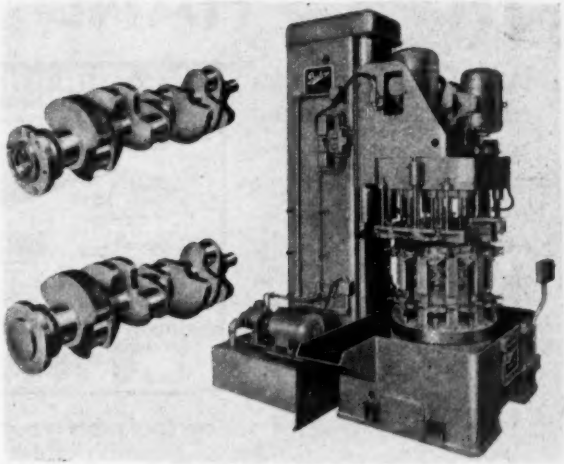
Use Foredoms to Grind, Polish, Drill, Rout, Carve, Mill, Saw, Slot, Clean, Sand, Etch, Engrave, etc., etc.

Send for catalog No. 330, showing different uses of Foredom Flexible Shaft Machines.

FOREDOM ELECTRIC CO., Dept. 330, 27 Park Pl., New York 7, N.Y.

Twenty-six operations in 96 crankshafts per hour

Twenty-six operations on 96 crankshafts per hour at 80 per cent efficiency is what is claimed for this vertical Buhr special multiple-spindle machine. Designed to process crankshafts on the new V-8 engine of one of the leading automobile manufacturers, this high production equipment consists of a 26-spindle combination drilling and tapping head, a 10-station holding fixture and a precision automatic index table.



Operation includes drilling and tapping six 7/16-20 holes, drilling and reaming one 7/16 dowel hole, plus drilling, reaming and counterboring center hole.

Considerable thought was given to the design of fixture in anticipation of possible part changes which might later be incorporated at minimum cost and downtime.

One of the engineering features of this

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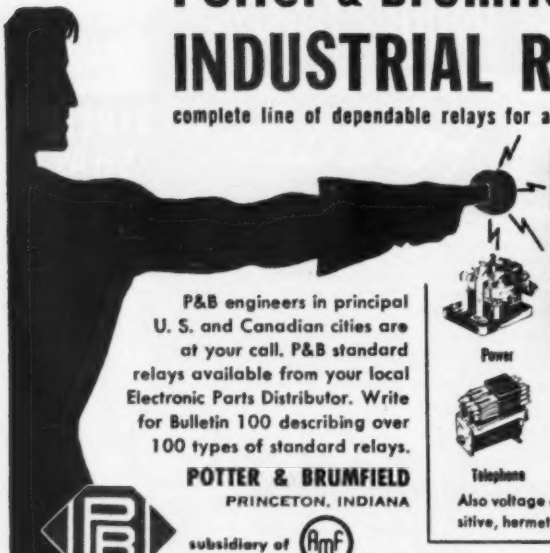
INDUSTRIAL RELAYS...

complete line of dependable relays for all types of circuits such as:



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- MACHINE TOOL AND MOTOR EQUIPMENT CONTROL PANELS
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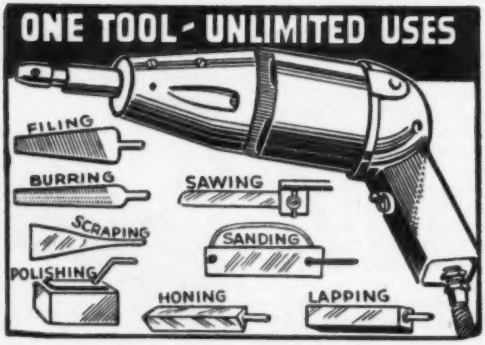
Use these Handy PORTABLE ELECTRIC RECIPROCATING TOOLS for Greater Production, Better, More Uniform Work — All with less Operator Fatigue. Fixed strokes are ⅛" or ⅜" long. Operate on 110 volts AC-DC. Deliver 1000 PUSH-PULL strokes per minute.



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ACME TOOL COMPANY

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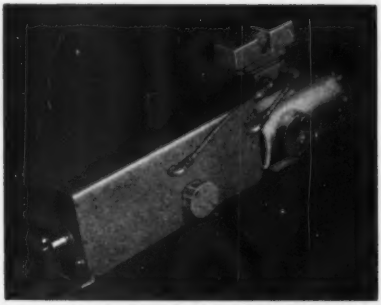
"Special Machine Tool Builders"



Illustrated above is a Model 4M unit with spindle travel of 6" and 120 r.p.m. This unit has a 6½ second duty cycle.

For detailed information regarding the application of the Fen Automatic Wrench to your machines, phone, wire or write.

Do you want a compact, self contained wrench to operate gripping fixtures on your machines? If so, contact the:

FEN

MACHINE COMPANY

28914 Lakeland Blvd.

Box 274 Wickliffe, Ohio

machine is that the combination drilling and tapping head was built as one unit. Standard Buhr features also incorporated in the machine include hardened and ground tool-steel ways; automatic lubrication; ball-bearing multiple heads with shaved gears and broached and splined drives, and all hydraulic and electrical installations conform to J.I.C. standards. Buhr Machine Tool Co., Ann Arbor, Mich.

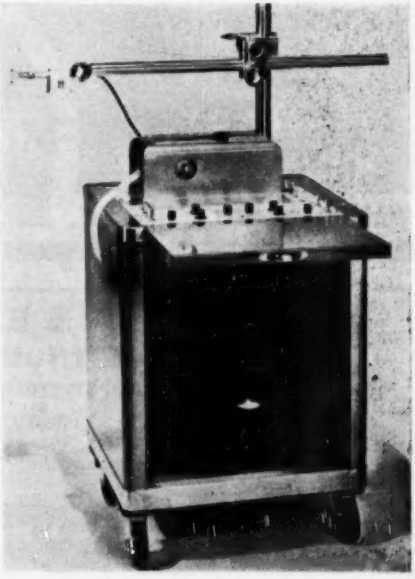
Use ACTION Card, opposite page 64. Encircle No. 76

Tension load measuring unit

A new Tension Analyzer for measuring and recording instantaneous tension loads in filamentary materials has been announced by Brush Electronics Co., Equipment Dept. RT-2 BB, 3405 Perkins Ave., Cleveland 14, Ohio.

This unit is equally applicable to all textiles and to fine wire of reasonable flexibility. It will measure both static tension levels and dynamic tension variations while the material is running at high production speeds.

Use ACTION Card, opposite page 64. Encircle No. 77



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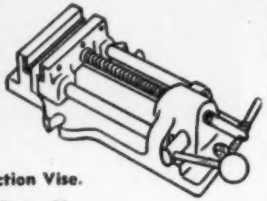
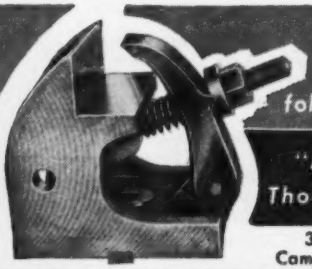


For Information Write Dept. M

Hartmann Mfg. Co., 1637 Goold St., Racine, Wisconsin

SAVE Time and Money on Set-ups, without special expensive jigs and fixtures

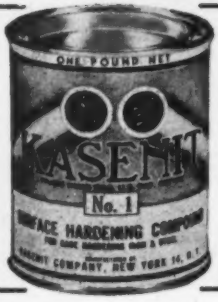
HART MILLING FIXTURES



Write for illustrated folder about the "Masters of A Thousand Set-ups"

WALTER W. FIELD & SON, INC.

39 Hayward St., Cambridge 42, Mass.



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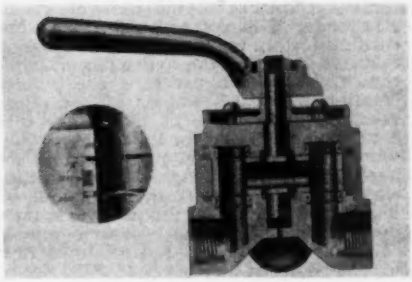
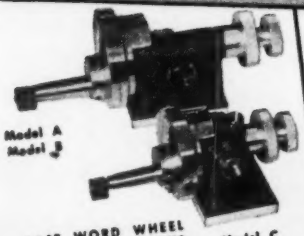
6000 psi Lo-Torq selector valve announced

A balanced selector valve has just been perfected which is claimed to handle pressures up to 6000 psi with ease. The valve consists of a body, ported as desired, which encases a disk having internal flow passages. As the disk is revolved to produce flow through the ports, sealing rings take effect and eliminate cross leakage within the valve.

Proof of ease of turning is the fact that a 6" handle is more than adequate



Improve Your Operating Efficiency, Quality and Profits with these LAST WORD Metal-Working Products!

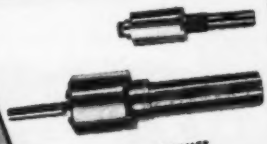


Model A
Model B

Model C

LAST WORD WHEEL DRESSERS FOR RADIUS AND TANGENT ANGLE DRESSING — AVAILABLE IN 3 MODELS. MODEL A—For grinders using wheels up to 20" dia. MODEL B—For small model surface grinders with 7" max. wheel dia. MODEL C—Compound Dresser, will compensate for compound angles involved in grinding form tools.

SAMSON "Heavy-Duty" OFFSET BORING CHUCK—Has positive centering feature for drilling and milling operations. Complete accessories available.



GRAY-GRIMES FLOATING DRIVER—For reaming, tapping, valve seating and similar operations. Can be supplied with standard or special shanks and adaptors.

GRAY-GRIMES AUTOMATIC STEADY-REST FOR O. D. GRINDING—Permits grinding complete length of shaft maintaining constant pressure against work. Piece as stock is removed.

Mfg'd by Gray-Grimes Tool Co.

Send for complete data

LAST WORD sales company

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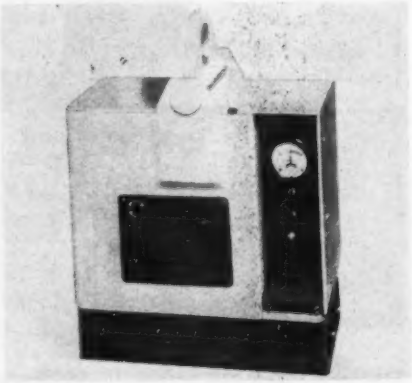
for easy turning of the disk of the 1" size under 6000 psi pressure. This low turning torque is obtained by two design features, based on the hydraulic principle that fluids under pressure exert force equally in all directions. First, fluid reaches "both" sides of the rotary disk causing it to "float" in its chamber, thus eliminating directional pressure, and the need for thrust bearings. Second, sealing rings are designed with a larger area on the bottom of the seal than on the surface toward the disk, thus positive contact of the seal is assured, regardless of flow direction or pressure. Back pressure will not unseat the seals. There is an equal number of seals on each side of the disk (two at each port), again balancing pressures. Highly finished parts and "O" rings eliminate internal leakage.

Made in sizes ⅜" to 1" for 0-2000 psi, and ⅛" to 1" for 0-6000 psi, for most services; for air and gas service, 0-1000 and 0-3000 psi, respectively. Three types of portings—side or bottom pipe tap, and sub-plate mounting. For complete information write to Republic Manufacturing Company, 1930 West 77th St., Cleveland 2, Ohio, requesting Bulletin No. 454.

Use ACTION Card, opposite page 64. Emircle No. 49

Sundstrand battery-operated lift magnet

The new lift magnet being manufactured by the Sundstrand Magnetic Products Co. (Division of Sundstrand Machine Tool Co.), Dept. B, 1020 9th St., Rockford, Ill., is powered by a common 6 volt automobile battery and can lift



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New Yale & Towne 2 Ton Spur Geared

CHAIN HOISTS

Gov't. Surplus—Original Boxes
List Price $235.00

WHILE SUPPLY LASTS **$124.50**

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Also 6" H.D. Swivel Rock Island VISE. List $104.

$69.50

Rated Firms 30 days or send 25% Dep. with order. Bal. C.O.D.

Write for complete surplus list

Atlas Equipment Co.

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Specify DESTACO FEELER STOCK

For precision fitting, checking clearances, inspection and production work. Available in 12" strips, ½" wide, in cellophane, packed 12 pieces of one thickness to a box; also in 25-foot coils. 14 standard thicknesses from .0015" to .015".

DESTACO DETROIT STAMPING COMPANY

347 MIDLAND AVENUE • DETROIT 3, MICHIGAN

2000 lbs. of finished mild steel. It is fast and easy to operate; operator has only to turn the switch, eliminating cumbersome chain or rope hitches and eyebolts. There are no attached cords or wires to restrict length of haul. The recessed control panel contains an operating switch, a dial to indicate the need of recharging and a receptacle for a trickle charger plug.

A 4 ampere battery charger for recharging a run down battery is available as extra equipment. It can be plugged into any 110 volt electrical outlet.

The magnetizing surface is 7" x 12½" and height of the entire unit is 12½". Weight is 120 lbs.

Use ACTION Card, opposite page 64. Encircle No. 50

Collar for diamond wheels

The Queen City Carbide Tool Co., Dept. B, 2339 Gilbert Ave., Cincinnati, Ohio, has announced production of its Easy-Tru collar, claimed to true diamond wheels accurately and speedily. The collar eliminates paper shimming, prevents uneven wear of the wheels.

Four cone-point socket screws are

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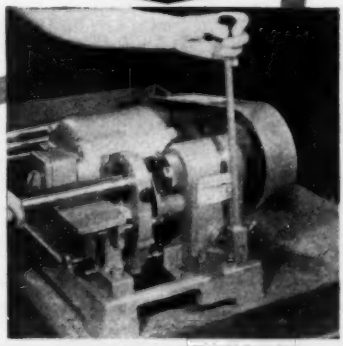
• CHAMFERING
• POINTING
• FACING
• REAMING

PINES No. 600



The Pines No. 600 End-Finishing Machine is designed for fast, accurate work. Women operators commonly debur up to 800—1" tube ends per hour. Exclusive operating features include single lever control which clamps and feeds work to rotating cutters in one pass, enabling operator to have one hand free for stock handling. Small and compact, the Pines machine is equipped with quick, interchangeable tool holders, chuck inserts, 8-speed sheave (760 to 3920 rpm), sturdy spindle, and grease-sealed precision bearings. The No. 600 unit illustrated, handles stock diameters up to 2". Maximum feed stroke is 1¼". Automatic air-operated units are also available for higher production work, and larger models for stock sizes up to 5".

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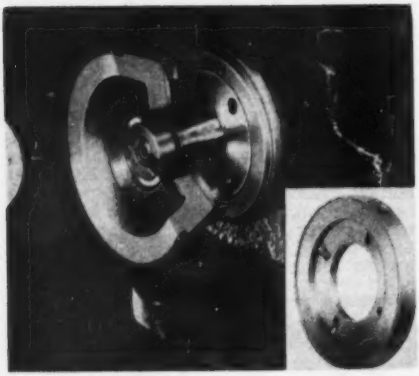
Write for facts on how these machines cut costs on a wide range of work.

PINES ENGINEERING CO., INC.
Specialists in Tube Fabricating Machinery
698 WALNUT • AURORA, ILLINOIS

PRODUCTION BENDING • DEBURRING • CHAMFERING MACHINERY



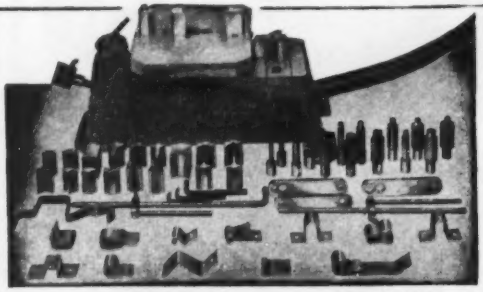
spaced 90 degrees apart around the collar. Safety band slides over outer surface of the collar, covering screws during operation, and four holes in band make screws accessible during adjustment process.

Collar flange fits snugly over adapter, replacing ¼" adapter collar, which brings screw points in line with forward face of adapter shoulder. Diamond wheel is then mounted conventionally.

Use ACTION Card, opposite page 64, Enclrcle No. 51

Welding machines being made by Sheffield

Both disc and point type automatic welding machines are included in the



Multiform BENDER-CUTTER

CUTS, BENDS, PUNCHES

Available in hand or air operated models, the MULTIFORM is shipped complete with full assortment of dies and mandrels to punch, bend and cut round or flat brass, bronze, aluminum, steel, etc., up to ⅛" x 1½" as illustrated, other models up to ¼" x 4".

J. A. RICHARDS CO.
KALAMAZOO, MICH.

Specify DESTACO Arbor Spacers and Shims

For milling, slitting and gang-saw setups, shimming gears and bearings. Sets in 20 diameters ⅜" to 4". 19 graduated thicknesses .001" to .125", specials over .125". Spacers with keyways, shims without. Stocked by Industrial Distributors.

DESTACO DETROIT STAMPING COMPANY
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line of machines, machine tools, precision measuring instruments and allied products manufactured by the Sheffield Corp., 721 Blue St., Dayton, 1, Ohio.

These highly specialized machines are used for high speed, low cost automatic welding of precious and semi-precious metal contacts to leaf springs, small contact arms, and other instrument components. Gold, silver, platinum, palladium, and iridium are a few of the metals used for the weld.

Use ACTION Card, opposite page 64. Encircle No. 53

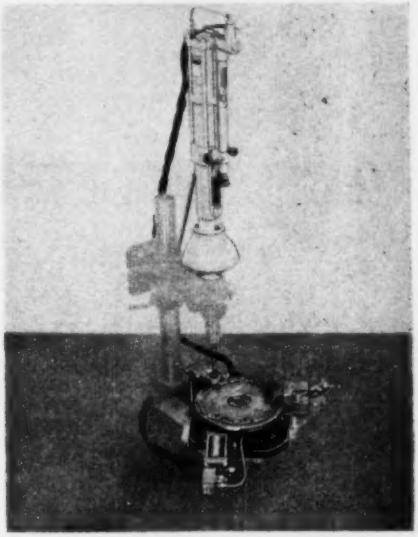
Automatic drill feed control valve

A drill feed control valve which automatically synchronizes the indexing of a rotary table to the automatic drill feed has been introduced by the Machine Tool division of the General Pacific Corp., Dept. MTB, Los Angeles, Calif.

This control valve is claimed to provide insurance against tool breakage. Another feature is that it permits the abundant use of coolants without the hazards of shock and fire.

Any change of adjustment can be made during the drilling cycle without affecting the rotary table, as the rotary table indexes only at the completion of the drill feed cycle. Control valves are available for use with both General's Model A and Model D drill feeds.

Use ACTION Card, opposite page 64. Encircle No. 54



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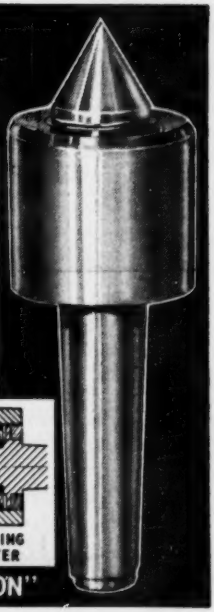

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WALTHAM . . . CYLINDRICAL SUB-PRESSES

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WALTHAM MACHINE WORKS WALTHAM 54, MASS.

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A Compound for
Tapping • Threading • Drilling • Reaming

NOT A CUTTING OIL!

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CUTS Clean Threads **STOPS** Tap Breakage
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A Division of Smith Corp. Yucaipa, Calif.

PORTABLE ELEVATING TABLE

Saves TIME and LABOR

Eliminate heavy lifting and cut handling costs. Slight foot pressure varies height from 31" to 46½", leaving operator's hands free. Table swivels and locks in any position.

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112 WEBSTER ST., DAYTON, OHIO

HIGH SPEED or CARBIDE BORING TOOLS

For MASS PRODUCTION

LAPPED CUTTING EDGES FOR BETTER "BORES" AND FASTER FEEDS

FOR HOLES FROM 1/16" UPWARD
17 DIFFERENT SIZES

- FAST PERFORMANCE
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Dealers! Here's a Profit-Maker!

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COMET Tool Co.

738 MT BROADWAY
NEW YORK 3, N.Y.

New line of 4-way valves

A new line of pilot operated, solenoid controlled 4-way valves designed to provide porting and positioning arrangements in circuits up to 3000 psi has been introduced by the Denison Engineering Co., Dept. MTB, 1160 Dublin Rd., Columbus 16, Ohio.

Pilot pressure can be external or internal and change-over is made by rotating the solenoid valve 180°. This feature cuts change-over time to only two minutes. A choice of spool types and spool positioning provides the combinations needed for a wide range of applications. Capacities are 20 gpm and 1¼ gpm for the ¾" pilot and ⅛" solenoid valves respectively. These two series are available singly, also.

Use ACTION Card, opposite page 64. Encircle No. 85

Boring machine has no levers

Ex-Cell-O Corp., 1212 Oakman Blvd., Detroit, Mich., has announced the Style 312 precision boring machine. Cam followers impart the rise and fall of the cams directly to the machine table and cross slide; there are no levers.

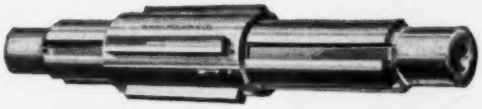
The machine is designed to accommodate parts that can be rotated on one or more spindles while the non-rotating tools are supported on the cross slide. In production contouring work in which forms must be reproduced over and over again within close tolerances, forms can be inspected by checking only one dimension, it is claimed, because accuracy and relationship of other dimensions are determined by the cams.

The contour form is obtained by the longitudinal movement of the machine

SET OF

14 Nicholson Mandrels

Takes Every Size Bore ½" to 7"



Actually 209 solid arbors would be required to fit all bores between ½" and 7", advancing by 1/32". But 14 Nicholson Expanding Mandrels will accommodate this entire range, and all in-between sizes as well. Hardened tool steel. Sold singly or in sets. The standard in shops the nation over. BULLETIN 653 shows how to save time, promote precision with these widely used tools.

117 Oregon St., Wilkes-Barre, Pa.

W. H. NICHOLSON & CO.

TRAPS · VALVES · FLOATS

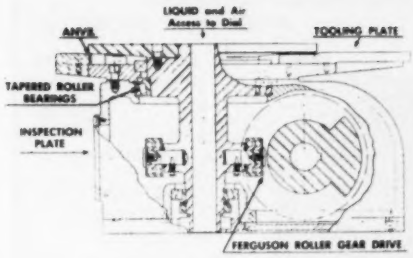
table coordinated with the lateral movement of the cross slide. The table carries the spindles with their drive equipment, is operated in rapid traverse by a pneumatic cylinder cushioned by oil. The feed portion of the table stroke is actuated by a cam opposed by an air cylinder. All cross slide movements also are produced by a cam opposed by an air cylinder.

Use ACTION Card, opposite page 64. Encircle No. 86

High speed index tables now standard units

Ferguson high speed index tables, first introduced by the Ferguson Machine & Tool Co., Dept. BTM, P.O. Box 191, St. Louis, Mo., on a custom design basis, will now be marketed as standard units under the name of the Ferguson Intermittor.

Tables have 4, 6, 8 or 12 stops with dial sizes varying from 12" to 36" in diameter. Variations in movement time range from ¼ to ¾ of the total cycle. The Intermittor is designed to permit passage of air or hydraulic fluid through the roller gear shaft and dial to the work area for actuation of product holding devices, or cooling water for dissipation of heat in operations such as induction welding. Brackets



are provided outside the dial periphery for attaching tooling such as drilling and tapping heads, staking presses and other forming, assembly and inspection devices.

Special acceleration and self-locking, zero backlash characteristics are said to permit smooth starting and stopping without auxiliary locking methods, even at speeds as high as 500 indexes per minute.

Use ACTION Card, opposite page 64. Encircle No. 87

Vibratory parts feeder gently handles fragile, explosive parts

Designed for automatic processing of

66" Diameter Facing Capacity

also...

- Boring
- Facing
- Milling
- Tapping
- Drilling

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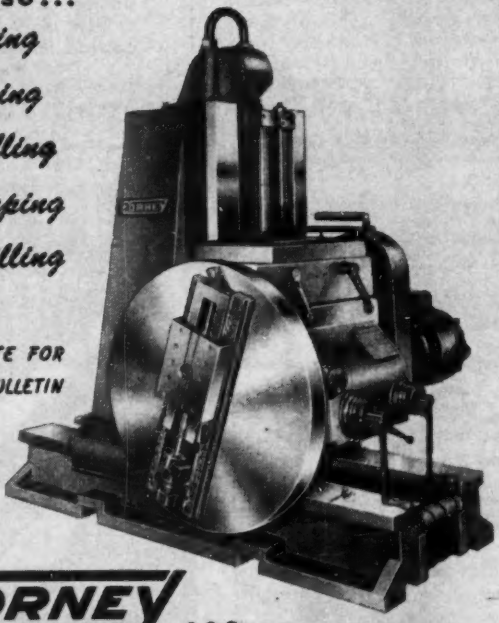

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7 COLORS

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BY FAIRFIELD GAUGE CO.

NO OTHER GAUGE COMPARES FOR FAST, ACCURATE LAYOUT AND MEASURING

Capacities to 6" when used with this Fairfield Gauge 3" Riser

The Micro-Height Gauge is a precision instrument, finished in satin chrome, which reads like a micrometer and measures from zero at base to 3" in thousandths.

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Keyway Cutting
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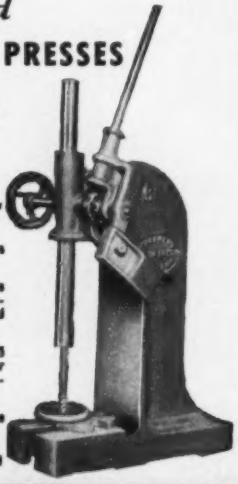
And many other jobs



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From 1½ to 75 tons pressure for motor driven hydraulic presses

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Heavy Duty

Live Centers

Write for catalog of live centers

Adapted for heavy duty work. Precision type ball and roller bearings assure maximum capacity for high speed production and long service.

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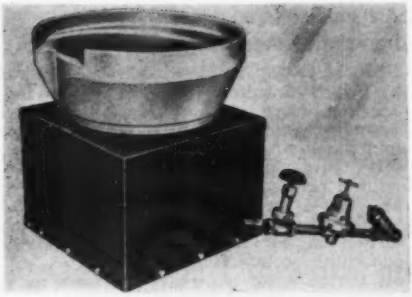
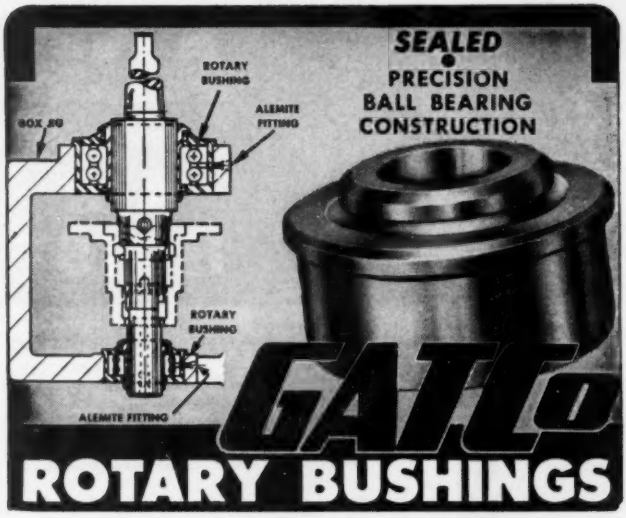


small parts where equipment must operate under explosive atmospheric conditions, the Syntron Company's Fluid Power parts feeder handles small parts of various shapes and materials at controllable feeding rates.

Vibratory principle combined with pneumatic operation is said to insure gentle handling of fragile or explosive parts. Parts are delivered single file in oriented position at speeds synchronized to production requirements by means of simple spring and valve regulators.

Use ACTION Card, opposite page 64. Encircle No. 88



FOR DRILLING, CORE DRILLING, ROUGH AND FINISHED BORING

The inner race of the GATCO bushing rotates with the tool, piloting the tool accurately below or above the work—or both.

Eliminates expensive tool construction—Reduces tool wear—Prevents seizure and pilot breakage—Especially adapted where precision is required.

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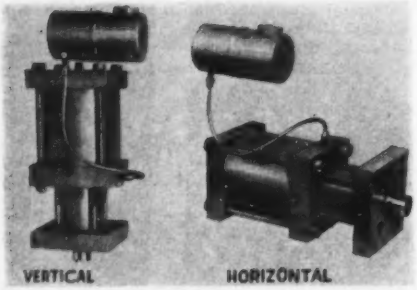

Air power head for vertical or horizontal mountings

Model D 50 air power head developed by Air-Hydraulics, Inc., 255 Belden Rd., Jackson, Mich., has a 1" stroke, attains 5 tons pressure, may be mounted in various positions.

It operates on air pressures up to 150-lb. with a ratio of 100 to 1. Over-all size is 6½" x 6½" x 16" long. The ram is 1½" in dia. The power head can also be furnished in varying sizes and capacities, according to specifications.

Use ACTION Card, opposite page 64. Encircle No. 21

Faster **...** ***Quieter*** **...** wide speed range, 3 sizes.

300 lb.—lift rate 75 ft. per min.
500 lb.—60 ft. per min.
1000 lb.—40 ft. per min.

Smaller **...** one man can easily install.

Safer **...** no spark hazard ... betters all safety requirements.

More Useful **...** for shipping docks ... refineries, chemical plants, heat treating, plating ... machine shops, foundries ... appliance, furniture, textile, automobile and aircraft assembly ... stock rooms.

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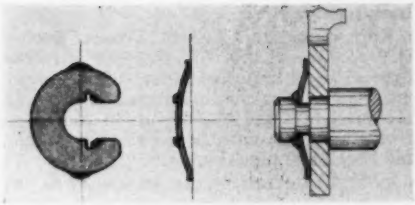
Also ... Air Tools ... Lubricating Equipment ... Aircraft Products ... Grease Fittings

Radially applied fastener locks in groove

A radially-applied retaining ring which can be locked in its groove and used as a shoulder against rotating parts, replacing nuts and bolts and eliminating the need for accessory fastening devices, has been introduced by Waldes Kohinoor, Inc., Dept. BB, 47-16 Austel Pl., Long



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IN SECONDS . . . WITHOUT TEARING DOWN SET-UPS

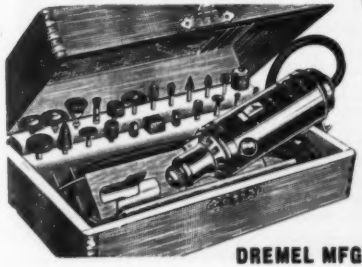
Do It Faster With A DREMEL MOTO-TOOL

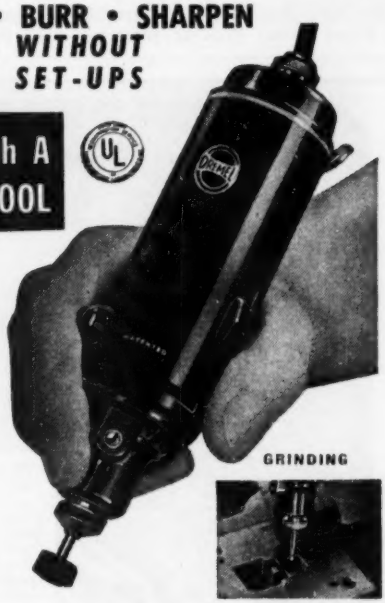
Dremel Moto-Tools are used in many different types of industries by thousands of diemakers, machinists and trained craftsmen for polishing and grinding dies, burring parts, sharpening cutters, etc. A money-maker and time-saver, the Moto-Tool does close work in seconds without tearing down costly production set-ups.

APPROXIMATELY 27,000 R.P.M.

MOTO-TOOL NO. 2, with one emery wheel point **$17.85**

MOTO-TOOL KIT NO. 2, with 23 accessories (high speed steel cutters) and Model 2 Moto-Tool in sturdy steel case **$25.95**





GRINDING

SHARPENING

BURRING

See Your Nearby Industrial Distributor or write for Catalog.

DREMEL MFG. CO., Dept. 214-L Racine, Wis.

Island City, N.Y.

Known as the Waldes Truarc Series 5139 retaining ring, the fastener is made of spring steel and is shaped like a bowed horseshoe. It is manufactured in sizes to accommodate shafts ranging in diameter from ⅛" to ½", with larger sizes available for special applications.

Use ACTION Card, opposite page 64. Encircle No. 105

Utility drills, bridge reamers

A utility drill for tougher portable body and sheet metal drilling jobs requiring a sturdier, shorter drill has been announced by Chicago - Latrobe, Dept. MTB, 411 W. Ontario St., Chicago 10, Ill. Available in fractional sizes: 3/64" through ½" dia. Wire gauge sizes: No. 1 through 60.

Another new product is the Type 344 four flute bridge reamer, designed to promote free cutting action with more chip space. The left hand spiral is claimed to prevent grabbing or hogging-in with subsequent stalling of air tool. Sizes: 13/32" through 1½" dia. A pilot point facilitates entry in small or irregular holes.

Use ACTION Card, opposite page 64. Encircle No. 106

World's Hardest Metal
TOOLS
BLADES
ROLLS
BAR STOCK
DIES
Many times more durable than steel, Talide Metal adds years of life to the wearing edges of tools, dies, machinery and equipment.
Hard as a diamond and almost indestructible, it triples output per man and per machine.
For good service and recommendations for improving any cutting, drawing or wear-resistant application, send particulars to Metal Carbides Corp., Youngstown 7, Ohio. Write for Catalog No. 54-G
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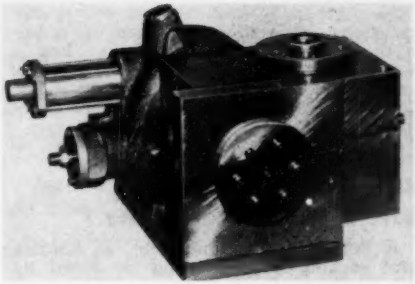
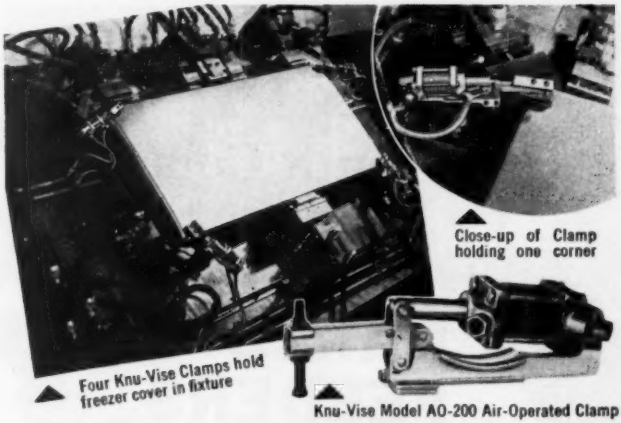
SINTERED CARBIDES · HOT PRESSED CARBIDES
HEAVY METAL · CERMETS · HIGH TEMPERATURE ALLOYS
OVER 25 YEARS' EXPERIENCE IN TUNGSTEN CARBIDE METALLURGY

Speed indexer contains adjustable shock control unit

The Erickson multiple position indexer No. 477 indexes up to 500 positions, depending on the gear ratio and index plate ordered. A self-contained shock control unit can be adjusted to meet varying loads; it is claimed that maximum speed can be used without injury to mechanism or work. Over-ride is said to be completely eliminated. The hardened and ground index lock pin operates independently of actuating fluid.

Unit can be installed in four different





Close-up of Clamp holding one corner

Four Knu-Vise Clamps hold freezer cover in fixture

Knu-Vise Model AO-200 Air-Operated Clamp

Air-Operated Toggle Clamps in Automation

Here is a good example of how an air toggle clamp fits into the automatic sequence of piercing and notching. Four Knu-Vise air-operated toggle clamps, Model AO-200, are used to clamp and release a large freezer cover automatically, increasing efficiency and economy. Failure of air pressure will not release the clamps, thus eliminating a possibility of scrappage. This operation is a daily performance at Ben-Hur Mfg. Co., Milwaukee, Wisc., and is only one of the many applications to increase production there and in scores of other industries. Perhaps there is a clamping method in your plant that we can make easier and faster. Send for catalog.

Sales offices in principal cities—Teletype DE 49

KNU-VISE PRODUCTS **LAPEER MFG. CO.**

3052 DAVISON ROAD • LAPEER, MICHIGAN

WESTERN DIVISION: 422 MAGNOLIA, GLENDALE, CALIF. CANADIAN DIVISION: HIGGINSON ENGINEERING, HAMILTON, ONTARIO

positions. Operation is either by air or hydraulics. The drive spindle has a flange for convenient mounting of work holding fixtures. The Erickson Tool Co., Dept. B, 2321 E. Hamilton Ave., Cleveland 14, Ohio.

Use ACTION Card, opposite page 64. Encircle No. 107

Bit holders and sockets have magnet for screw, nut

A new series of magnetic bit holders and sockets is now being produced by The Apex Machine & Tool Co., 1028 S. Patterson Blvd., Dayton, Ohio.

A permanent magnet holds the screw or nut firmly in position, expediting work in close quarters and hard-to-reach spots. Magnetic force is great enough to permit working with tool in vertical position without dropping the screw or bolt. Holders have a bit retaining ring which holds bit in place, prevents it from pulling out of the holder during operation.

Use ACTION Card, opposite page 64. Encircle No. 108

When It Comes To Handling Small Parts - *SYNTRON*

PARTS FEEDERS

. . . provide automatic, controlled feeding at lower costs

Handle small parts of nearly any shape or material in oriented position—single file—without damage. Instantly controllable feeding rate insures steady flow of parts at required production speeds. Electromagnetic—no mechanical wearing parts—ideal for use in automation set-ups.

Write for FREE Catalogue Data

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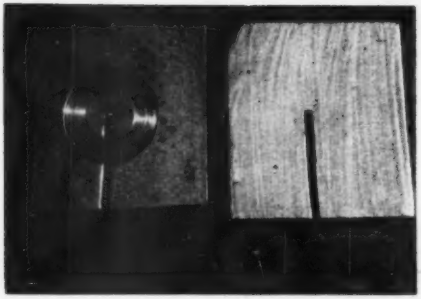
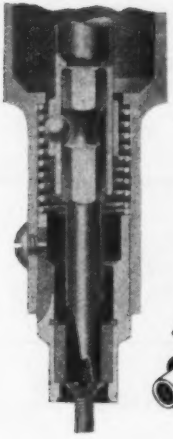


Both of the brass squares (left) were subjected to the same treatment (a hollow steel rod was rotated against them for 20 minutes at 1725 rpm under 75 lbs. pressure). The one on the right was protected by a coating of Tungstide, and was not even marked; the one on the left was worn to a depth of nearly 1/16". Manufacturer of the metal cladding liquid is the Lockrey Co., Dept. BB, Southampton, N.Y.

Use ACTION Card, opposite page 64. Encircle No. 109

For driving slotted screws
MAGNA FINDER
does it easier, cheaper



The Magna Finder picks up the screw, positions it...so that with one-hand control the bit automatically enters the slot of the screw and drives it home. Alnico Magnet has ten times ordinary "pull" and positively positions screw. Results? Production up, costs down.

Interchangeable with regular power screwdriver finders. Available for *all* makes of power drivers and *all* kinds of screws. Thousands in use. Ask your power screwdriver salesman for a demonstration of the complete Magna Driver line.

NEW manual ready; write Dept. 45F. Complete information on Magna Bit Holders, Finders, Sockets and Hand Screwdrivers. Magna Driver Corporation, 779 Washington Street, Buffalo 3, N. Y.

Roller-lapping machine gives fine finishes

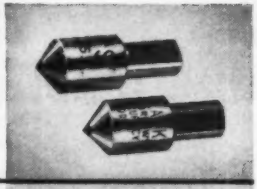
A roller-lapping machine announced by Spitfire Tool Co., Dept. B, 2931 N. Pulaski Rd., Chicago 41, Ill., laps metal, glass, or plastic plugs, rods or pins from ⅛″ up to 6″ in diameter. Finishes as fine as 2 rms or less may be obtained.

The machine consists essentially of two precision-ground cast iron rollers, with shafts extending on both sides and revolving in adjustable bearings. The rollers are parallel, 12″ in length, one being 3″ in

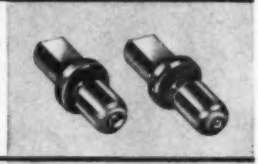
Call on CLARK

for All Your "Rockwell Testing" Needs

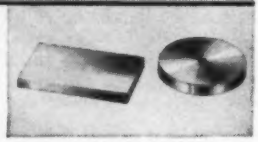
CLARK Diamond Cone Penetrators are exactly right for your "Rockwell" hardness tester, whether or not it bears the CLARK name. Every step in their manufacture, from careful diamond selection to expert lapping, leads to a precision product that will give you precision results. Yet CLARK Diamond Penetrators cost surprisingly little.



CLARK Steel Ball Penetrators, for accurate "Rockwell testing" of unhardened steel, cast iron, brass, bronze, and similar materials, are available in all standard sizes.



CLARK Test Blocks, in various hardness grades, provide a quick, sure, and simple method of checking the accuracy of your "Rockwell" type hardness tester.



Write today for descriptions and prices.

CLARK INSTRUMENT, INC.
10206 Ford Road • Dearborn, Mich., U.S.A.

CLARK

dia. and the other 6" in dia. The large roller is constructed with dual internal air chambers, vented by 4 openings for each chamber. This, plus the large mass of the rollers, keeps the temperature of the work down, thus making it unnecessary for cooling off periods, the manufacturer claims.

Both rollers, by means of a worm gear drive, rotate in the same direction, away from the operator, and at the same number of rpm's. A four-step pulley for V-belt permits varying the rpm's. The rollers can be adjusted or moved apart to accommodate different size workpieces. Operation of the unit is simple. No chucks or rings are used. Work may be removed quickly and easily at any time for checking and measurement.

Use ACTION Card, opposite page 64. Encircle No. 110

Punching unit adapted for short runs

Toolset Div. of General Riveters, Inc., Dept. BB, 777 Hertel Ave., Buffalo, N.Y., has announced a single hole punching unit especially designed for low run pro-

Sensational NEW features

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The Perfect Lighting Tool for Machine Assembly Inspection

$8.12 Each in std. pkg. of 8 Less $10.50 ea.

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MODEL 2-WX-700 Overall Length 31"

Reflector—New bell ventilated shape with 5½" orifice. Rotates 360°. Accommodates 100 watt A-21 or R-30 lamps. Also PAR-38, R-40, RS-40. Available with lens, if desired.

Arm Joints — New patented tension disc design. Easy, smooth action with only one hand. Available with 1, 2 or 3 arms.

Base—Universal for vertical or horizonal mounting. Also adaptable to outlet boxes. Collet revolves 360°.

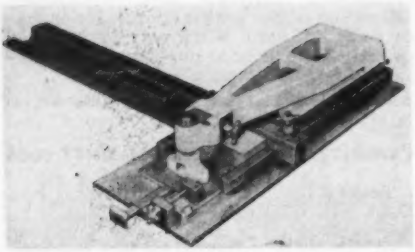
Wiring—Medium screw porcelain socket. "T" rated toggle switch. 8 ft. POT-32 18-2 heavily insulated oil resistant wiring with molded plug.

Finish—Gray baked enamel. Reflector interior, high temperature White.

WRITE for complete catalog of Localite models for every industrial use.

THE FOSTORIA PRESSED STEEL CORPORATION
Fostoria, Ohio
Localites available through wholesalers everywhere

LOCALITE fostoria for Light ON the Job

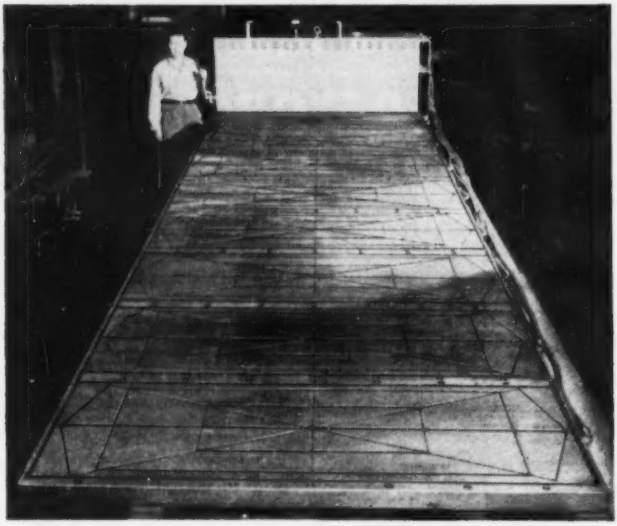


duction. Called the Quickset unit, it will pierce from 3/32" to 2⅛" diameter holes in up to ⅛" thick mild steel.

The unit has a 24" throat depth and is furnished with a 36" combination back gauge and end stop bar, which slides along a pair of rails in which holes at 1" intervals are provided. A screw type adjustment on the C frame allows for setting up dimensions between 1" intervals.

There are no friction clamps on the unit. Once the gauge has been set up it is locked in place by solid metal in shear.

Use ACTION Card, opposite page 64. Encircle No. 111



WALKER, pioneer in the chuck industry, has been utilizing magnetic force to make all types of special and standard chucks since 1887.

WALKER now harnesses atmospheric force for special vacuum chucks to hold non-magnetic materials. Pioneer in magnetic force—now pioneer in atmospheric force.

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Overall Length 12" — *Measuring Capacity 8½"*

World famous for accuracy. Hand fitted Vernier slide insures smooth, snug operation. Wide Vernier, exceptionally easy to read. English or English and Metric graduations. LENGTH UP TO FIFTEEN FEET

Handsome, form-fitting wooden case.

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Take the GLARE out of Micrometer Reading

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MEASURE TO 1/10,000th

All graduations are well-defined black lines on dull chrome surface for easier and surer reading, even in poor light. Guaranteed accurate within one half of a ten thousandth of an inch.

Drop-forged model with chrome finished micrometer head, from $8.25 up. *Ask for Micrometer Catalog*

No. 901C 0-1" Size with LOCK NUT and RATCHET and 10th vernier as shown $13.25

This tool with TUNGSTEN CARBIDE tipped anvils $15.75

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Wherever continuous hinges and metal corners are needed, you'll find the answer at Rex . . . a reliable source of supply with the finest facilities to meet your requirements. Hinges furnished in brass, aluminum, stainless and steel.

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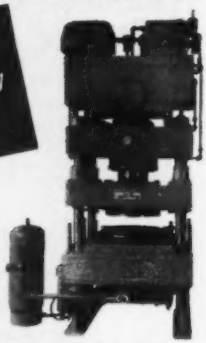
M&N Hydraulic Presses

Best Buy for any Metal Working Application



Available in single, double and triple action models.
Platen sizes: 12" to 60"
Capacities: 20 to 600 tons

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Price: $14,907
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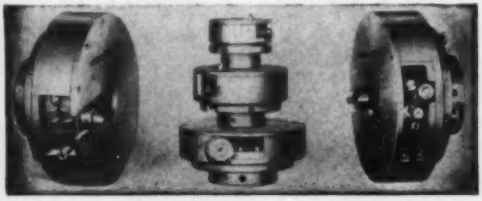

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34 BLOCK SET (shown)...$125 INCL. OPT. PARALLEL

82 BLOCK SET.....$275 IN CASE

These sets will supply the needs of any discriminating shop that must work to gage-block precision. IMMEDIATE DELIVERY

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You Need an Extra Hand Now
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HEIMANN TRANSFER SCREW SETS

IN 11 SIZES—No. 6 to 1" N.C. in all S.A.E. sizes.

Here is the *faster*, more precise way of transferring open and blind screw holes—make savings in "wage-dollars-per hour" of your expensive hands on every job. A die-and-tool maker's tool with many other applications for die makers and machinists. A set of 6 Hardened Screws nested in combination holder and wrench—no other tools needed. Get more work *now*—save money too!

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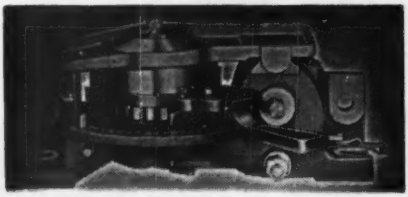
MODEL H . . . AUTOMATIC CHUCKING and INDEXING FIXTURE



1. 1800 light cuts per hour.
2. Either horizontal or vertical position.
3. Collets changed instantly.
4. Automatically knocks piece out.
5. Ratchet or degree indexing—degree indexing added later if desired. Capacity 1".
6. Automatic indexer also added later. Model F—Both degree & ratchet indexing. Capacity up to 2¼".

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Plain Type — Offset Type

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All hinges shown can be furnished with special holes, cutouts and bends to blue-print in metals to suit the job.

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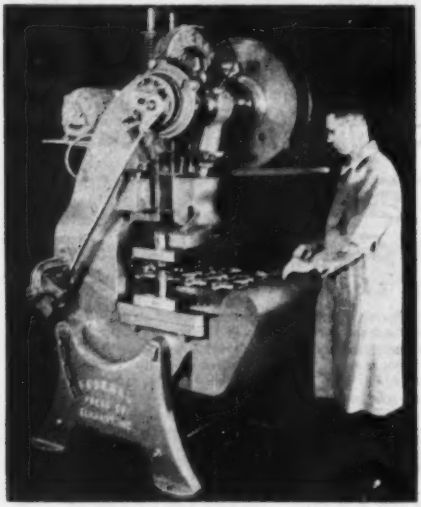
SPECIFICATIONS:
Open width 7/8" to 6"
Gage Material .040 to .123
Pin Diameter .101 to 1/8
Lengths to 120"

SEMI-OFFSET

Press has conveyor-type feed

A press featuring a conveyor-type feed has been introduced by Federal Press Co., 509 Division St., Elkhart, Ind.

The press is capable of producing up to 7200 pieces per hour. A wide ram and wide bolster plate permit a correspondingly wide chain conveyor with 19 pairs of stations.



Safety stop mechanism is claimed to assure perfect alignment at each work station and also functions to stop the press in case of jamming or mis-alignment. Pressings are automatically ejected from the conveyor and slide into containers at the rear of the press.

Use ACTION Card, opposite page 64. Encircle No. 114

Custom made stamped spanner wrenches

The Dayton Rogers Mfg. Co., Dept. B, Minneapolis 7, Minn., is providing die-cut stamped spanner wrenches in small

quantities without the cost of conventional die tooling.

They can be produced from practically any sheet alloy, blanked and formed and provided complete with necessary heat treating and finish.

Use ACTION Card, opposite page 64. Encircle No. 115

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SAVE 75%

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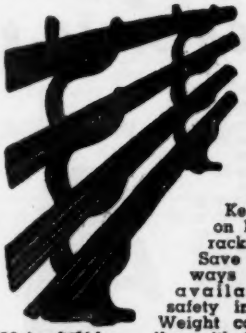

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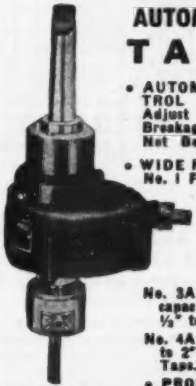
AUTOMATIC REVERSE TAPPERS



- AUTOMATIC TORQUE CONTROL . . . One Minute to Adjust . . . Prevents Tap Breakage . . . Operator Need Not Be Skilled.
- WIDE RANGE TAP CAPACITY No. 1 FRICTION DRIVE TAPPER —Capacity No. 2-56 to 3/8" in Steel 1/2" in Aluminum. No. 2B POSITIVE TAPPER—capacity 3/8" to 7/8" in Steel

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- PRODUCTION THREADERS with Round Split . . . Button . . . Acorn Dies
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in inch grams
...inch ounces
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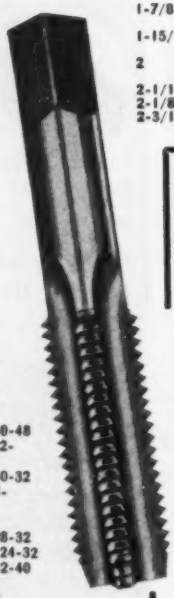
HIGH SPEED RIGHT HAND TAPS

SIZE	THREAD
4	32-48-60-64
5	30-32-36-48-80
6	36-40-48-56-60
7	32-40-48
8	24-30-36-38-40-44-48
9	24-28-32-40-48
10	28-30-36-40-48-64
12	20-28-32-36-48
14	20-24-28
1/16	60-64
5/64	36-48-72
3/32	48-56-60
7/64	48-56-60
1/8	32-40
5/32	32-36-40-48
9/64	36-40-48
11/64	36
3/16	20-24-32
13/64	32-36-48
7/32	24-28-32
1/4	18-24-26-27-30-32-36-40-48
5/16	16-20-22-27-28-32-36-40
3/8	12-16-18-20-27-28-32-36-40-48
7/16	12-16-18-22-24-27-28-30-32-36-40
1/2	12-14-16-18-22-24-26-27-28-30-32-36-40
9/16	16-20-24-27-28-30-32-40-48
5/8	12-14-16-20-24-27-28-32-36-40
11/16	11-16-18-20-24-27-28-30-32
3/4	9-11-12-14-18-20-24-26-27-28-32
13/16	10-14-18-20-27-32
7/8	10-12-16-18-20-24-27-28-32
15/16	8-9-10-12-14-16-18-20-24-32
1	10-12-16-18-20-24-27-32-40
1-1/16	12-14-16-18-20-24
1-1/8	8-10-14-16-18-20-24-32
1-3/16	8-10-12-14-16-18-20-24
1-1/4	8-10-14-16-18-20-24-32
1-5/16	12-14-16-18-20-24-32
1-3/8	8-10-14-16-18-20-24
1-7/16	8-10-12-16-18-20-24
1-1/2	8-10-14-16-18-20-24-28
1-9/16	18-20-24-36
1-5/8	5½-8-10-12-13-16-18-20-24
1-11/16	10-12-14-16-18-20-24



SIZE	THREAD
1-3/4	8-10-12-14-16-18-20-24
1-13/16	8-10-12-14-16-18-20
1-7/8	8-10-12-14-16-18-20-24
1-15/16	8-10-12-14-16-18-20-24-28
2	4½-8-10-12-16-18-20
2-1/16	12-14
2-1/8	12-16-20
2-3/16	12-16

SIZE	THREAD
2-1/4	4½-8-12-14-16-18
2-5/16	12-18
2-3/8	12-16-18
2-1/2	8-10-12
2-9/16	18
2-5/8	12-16-20
2-3/4	16
2-7/8	8-12-16
3	8-16
3-1/4	8-12-16
3-1/2	8-12-16
3-7/8	6
4	8-12

HIGH SPEED LEFT HAND TAPS

SIZE	THREAD
0	80
1	56-64-72
2	56-64
3	56
4	32-36-40-48
5	40-44
6	32-36-40
8	32-36-40
10	24-30-32-40
12	24-28-32
1/4	20-28-32
5/16	18-20-24-28-32
3/8	16-24-32
7/16	14-20-28
1/2	12-13-20-28
9/16	12-18-20-24
5/8	11-12-18-20-24

SIZE	THREAD
11/16	11-16-24
3/4	10-16-18-20
13/16	16
7/8	9-12-14-18-20
1	8-12-14-16-18-20
1-1/8	7-12
1-1/4	7-12-16-18
1-3/8	6-8-10-12-16-18-20-24
1-7/16	8-10-12-14-16-18-20
1-1/2	6-8-10-12-16-18-20
1-9/16	8-10-12-16-18-20
1-5/8	8-10-12-14-16-18-20
1-11/16	8-10-12-14-16-18-20
1-3/4	8-10-12-14-16-18-20
1-13/16	8-10-12-14-16-18-20
1-7/8	8-10-12-14-16-18-20
1-15/16	8-10-12-14-16-18-20
2	4½-10-12

We Specialize In High Speed Cutting Tools

SPECIAL PRICES TO DEALERS

LEFT HAND AND SPECIAL DIES IN STOCK

PRICES ON APPLICATION
NEW SIZES ADDED FREQUENTLY

NOTE: Oversize taps. Special size reamers. H. S. extension drills. H.S. Taper length drills No. 1 to No. 60—Letter sizes A. to Z. Fractional sizes 1/8" to 1/2", 12" Overall 9" flute length. H.S.S.S. aircraft drills 6" and 12" long.

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DUSTKOPS 22 MODELS
UNIT TYPE 300 cfm to 10,000 cfm
LOW COST ¼ hp to 15 hp

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For: Grinders, buffers, polishers, woodworking, lint . . . ALL DUSTS

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BY A QUICK, EASY, INEXPENSIVE METHOD
Your business letterhead will bring literature
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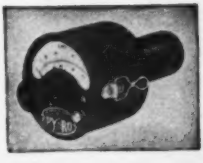
Wilmerding, Pa.

PYRO Radiation Pyrometer



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Ardmore, Pa.

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KIDDE PRECISION TOOL CORP.
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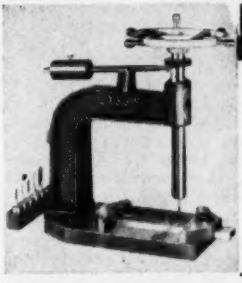

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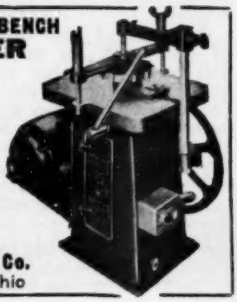


Portable — move directly to job; a time saver for both small and large shops.

3¾" stroke; adaptable for other work.

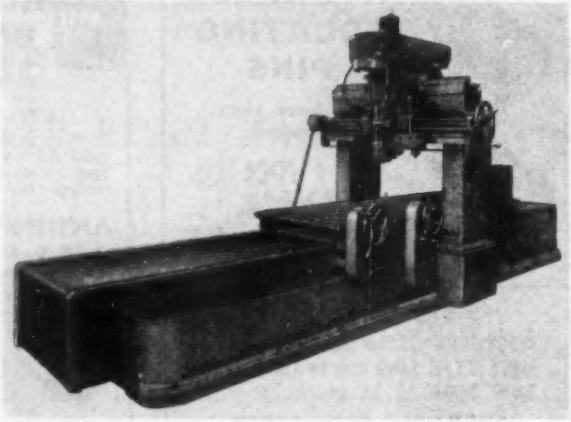
Low first cost—prompt delivery.

Good dealers wanted.

Reading Machine Co.
Cincinnati 37, Ohio

Machine mills and profiles difficult parts

The Morey No. 50 Aeroframe profile milling machine was designed for milling and profiling of irregularly shaped, complicated precision parts, such as air frames, cast iron frames for computing, type setting machines, printing presses, forgings for aircraft parts, etc.



The Aeroframe can be used for machining of any material, due to its range of speeds from 125 to 4600 rpm. The spindle is provided with a No. 50 standard taper. The standard machine is equipped with a two speed vertical motor 7½ hp at 1800 rpm, and 15 hp at 3600 rpm.

The cross rail and bed have replaceable hardened steel ways. The table and upper carriage carrying the spindle are mounted on roller bearings affording ease of operation.

Automatic lubrication is provided to the spindle bearings and upper carriage, one shot lubrication for table bearings.

The machine can be equipped either with a special hydraulic power feed unit actuating the table, upper carriage carrying the spindle, or both. With single control lever, feed is from 0 to 160" per minute in both directions.

Morey Machinery Co., Inc., Dept. BB, 383 Lafayette St., New York 3, N.Y.

Use ACTION Card, opposite page 64. Encircle No. 112

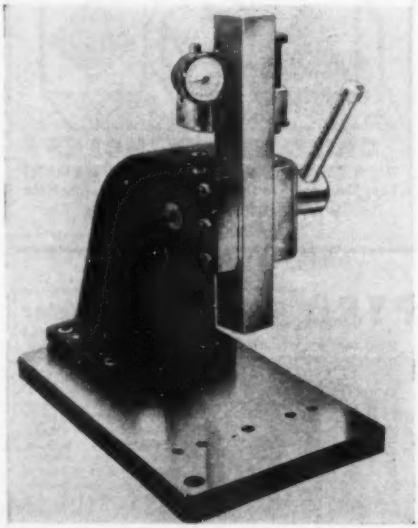
Press for work requiring accurate line-up, controlled depth

Micro press is manufactured by Queens Tool Eng. & Mfg. Co., Dept. MTB, 15 Front St., Rockville Center, Long Island, N.Y., for precision assemblies, piercing, broaching, forming, press fits and burnishing operations that require accurate line-up and controlled depth.

Ram and gear rack are of one-piece construction. After machining, teeth are milled, ram pack hardened and then precision ground in line with the .500 locating hole in end of ram.

One-half of stop engages in one tooth of gear rack for positive lock, and by means of clamping screw the stop is quickly placed in any position of ram. On one side of stop is a fine thread adjusting screw with lock nut bearing against a hardened stop plug in frame. On the other end of stop is located a dial indicator graduated in .001 and bearing against a fine thread adjustable stop screw.

After assembly the ram is checked for exact alignment with base. The ½" hole in ram is checked and held within .002



f.i.r. swung on a 5" radius with the base.

Use ACTION Card, opposite page 64. Encircle No. 113

THREAD BROACHING
ENDS TAPPING TROUBLES

Ultra Precision
THREAD-CUTTING BROACHES
deliver these advantages:

- End tapping trouble
- Produce threaded holes by a Shearcutting action
- Are practically unbreakable
- Ground from hardened high-speed solid blanks
- Require only half the power needed for tapping
- Have an amazing long life
- May be resharpened many times.
- Feed the chips out of the hole
- Lower production costs.
- Replace standard taps in most sizes.

SHEARCUTTER TOOLS COST LESS IN THE LONG RUN
These ultra-scientific cutting tools are used by practically every large manufacturing company in the U.S.A. Constant repeat orders prove their merit and value.
Patent Warning: All Shearcutter Tools are protected by U.S. and Foreign Patents, received, pending or applied for.

"ANOTHER AMAZING INVENTION OF RALPH GORDON FEAR

SHEARCUT TOOL CO.
MANUFACTURERS OF THE WORLD'S MOST SCIENTIFIC CUTTING TOOLS
7041-7045 Darby Avenue Dept BB-51 Reseda, Calif. (L.A. County)

which of these materials do you engrave?

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BRASS, COPPER, NICKEL-SILVER, DIE CAST METAL, PLASTIC, WOOD, ETC.

The PREIS-*PANTO 2 and 3 Dimensional Engraving Machines will engrave lettering or design on all of these materials.
Highly efficient precision machine, the *PANTO Engraver gives greater production speed and ease of handling on the part of the operator. Write today for latest illustrated material covering complete line of PREIS-*PANTO Engraving Machines and Accessories.
*TRADE MARK Reg. U.S. Pat. Off.

PANTO

H. P. Preis Engraving Machine Co.
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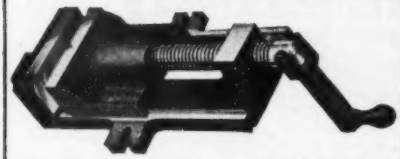
YOST DRILL PRESS VISE



This new Yost vise has been designed expressly for use on drill press operations. Does away with special and costly jig fixtures.

Offered in two sizes.

Vise No.	Width of Jaw, Inches	Opens Inches	Weight Pounds
1D	3½	3½	12½
2D	5	5½	23

Do you need a vise of ANY type?

Write today for bulletins on the extensive Yost line

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DOES IT BETTER
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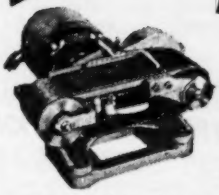
ABRASIVE BAND GRINDER



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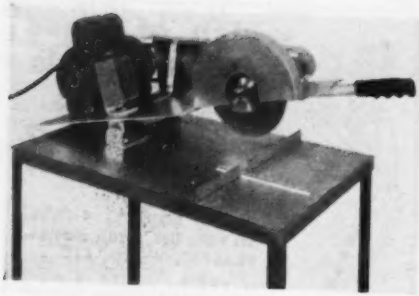

Portable cut-off machine

The Century cut-off machine, Aluminum Enterprises, Inc., Dept. MTB, 17815 Cliff Ave., Detroit 12, Mich., can be moved to any location in the factory or taken right out to the job.

Some features are: precision cast swivel mounting; heavy welded steel belt and blade guard that will accommodate any size blade up to 10"; spindle shaft mounted on sealed precision ball bearings; fences that provide for a straight or mitre cut; screw to adjust wheel to desired height.

Use ACTION Card, opposite page 64. Encircle No. 84

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Has fine ground lenses of optical glass. Neutralizes eye strain from close work. Binocular design gives third dimensional vision. Allows freedom of both hands. Wear over glasses. Plastic frame with adjustable headband.

SIZES: 20" focal lgth. 1½ power – 14" focal lgth., 1¾ power, 10" focal lgth., 2½ power; 8" focal lgth., 2¾ power . . . . . price each ONLY 10.50

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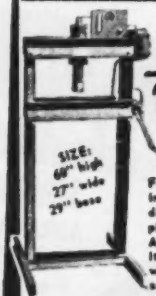
See our complete line. Pullers for Gears, Bearings, Wheels, Pulleys, Bushings, Shafts, etc.



NEW 10 TON HYDRAULIC PRESS

Use this Press in the Shop or take it with you on the job. Frame is 4" welded channel iron. Has 4½" stroke, 2½" diam. ram. Valve operates piston in both directions. Adjustable platform. Positive power Hand Pump with handle. 2000 PSI pressure gauge. 129.00

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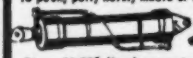

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Gives 20,000 lb. thrust using 1500 PSI line pressure as obtained from our hydraulic pumps. Will produce up to 40,000 lb. thrust with 3000 PSI. Can also be used on a low pressure air system. Has 4" bore; 18" stroke; 30½" long. Ideal for shop. USED 29.95

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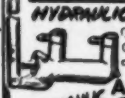

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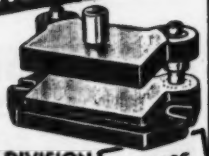

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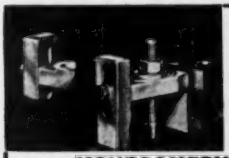

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Collet Closer includes front tapered sleeve not shown in photograph

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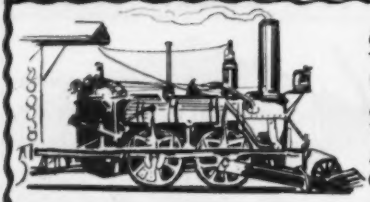
AL REETZ



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High Speed Threading Machine

Quick Switch FROM Pitch to Pitch

Versatile . . . that's the name for the Cri-Dan "B" high-speed precision threader.

Illustrated are 10 completely different parts—all of which were threaded on the Cri-Dan "B" at the Carmichael Machine Co. of Springfield, Ohio.

When it comes to high-speed precision threading the Cri-Dan "B" has no equal.

Key to the Cri-Dan's unexcelled speed and accuracy is the single carbide-point tool. Changeover is fast and tool cost is low.

Before you buy *any* threading machine be sure you get the facts on Cri-Dan "B". It has established new threading standards for speed, accuracy and versatility.

Write to Lees-Bradner for the whole story and the name of our representative in your city.

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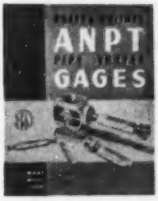

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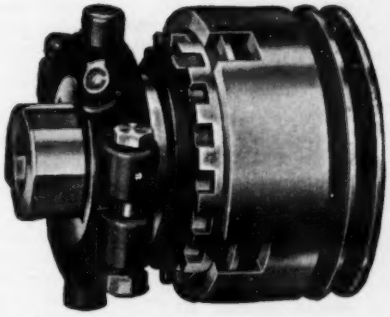

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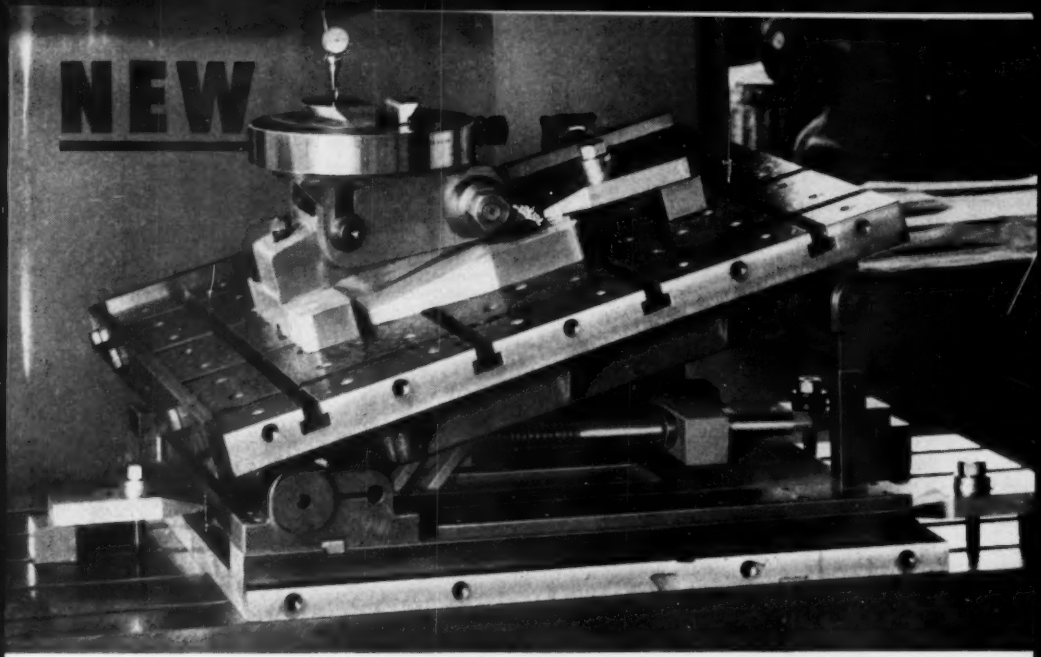

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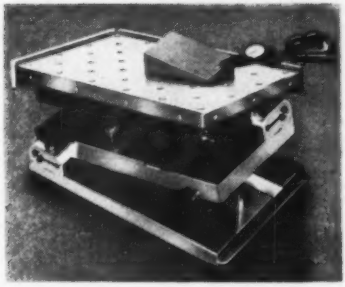

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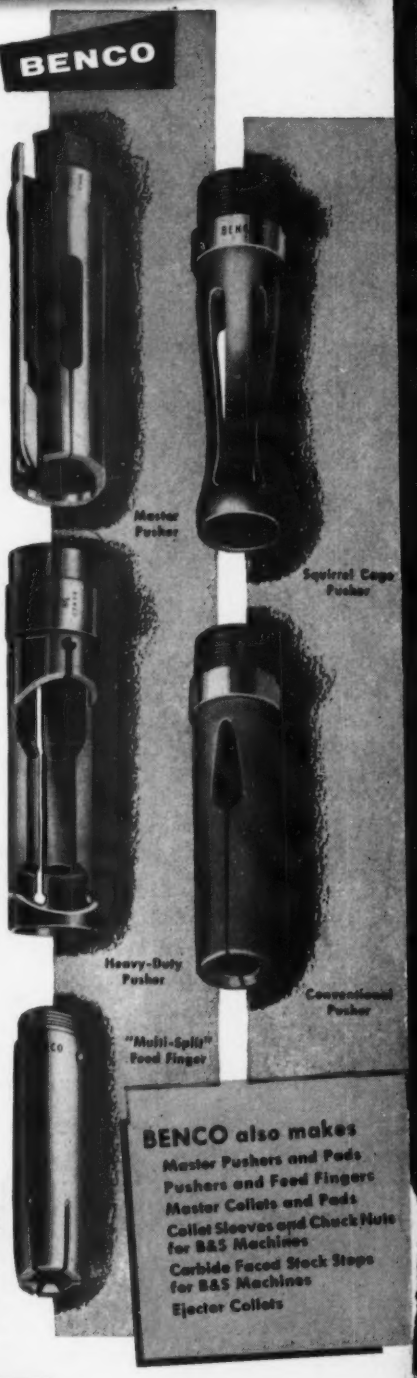

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